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**THE LIVING WARDROBE:**

**FASHION DESIGN FOR AN EXTENDED GARMENT  
LIFETIME**

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A thesis submitted in fulfilment of the requirements for the degree of  
Doctor of Philosophy

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## DECLARATION

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I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed.

Signed

Joanne Cramer

Dated February 2019



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## IMAGE CREDITS

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For the photoshoot conducted at the conclusion of the research study to illustrate the practice:

Model: Connie Bolger

Photographer: Tracey Lee Hayes

Hair and Make Up: Nicole Giardossi

Ethics approval to photograph participants in the course of the research study and for publication within the thesis was obtained. See Appendix 3.

Photographs not otherwise attributed are the author's own.

## GLOSSARY

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<b>Active Use</b>	The period during which a garment is in regular use. Active use is typically shorter than the overall duration of garment ownership, since the garment is typically unworn for some time prior to discard.
<b>Alter</b>	To make adjustments to a garment without significantly changing its look or function. For example, enlarge or reduce the waist girth, shorten or lengthen a sleeve.
<b>Custody</b>	Temporary ownership of the garment. Mutual responsibility as a framework for practices of fashion for sustain-ability, recasts garment ownership as temporary custody.
<b>Discard</b>	Divestment of the garment. Discard may not result in disposal into the waste stream, instead recirculation through donation or selling second hand.
<b>Disposal</b>	Consignment of the discarded garment to the waste stream. For example, into landfill.
<b>Extended Use</b>	Prolonged use of a product beyond the point at which it would typically be discarded.
<b>Fashion-ability</b>	The capacity of a garment to keep pace with changing trends in fashion.
<b>Garment lifetime</b>	The overall duration of use and extended use of the garment from creation until destruction, as distinct from the garment life cycle which is associated with quantitative measures like Life Cycle Assessment.
<b>Fashion</b>	For the purposes of this study, fashion is discussed as clothing-fashion (after Kawamura). Clothing-fashion refers to the garment artefact as the material object of the symbolic system of fashion.
<b>Mutual</b>	Experienced or done by each of two or more parties towards the other or others. (Macquarie Dictionary definition)
<b>Re-make</b>	To re-use garments through a method of deconstruction and reassembly of parts into new forms, possibly in combination with components from other garments. Sometimes called 'up-cycling'.
<b>Re-model</b>	To modify the visual appearance and/or function of the existing garment. For example, converting a dress into a skirt by removing the bodice. Re-modelling may be undertaken for the purposes of alteration or repair (for example, the bodice of the dress is too short or is stained).

<b>Repair</b>	To mend flaws in a garment. For example, to reattach a button, stitch a fallen hem, or patch a hole.
<b>Re-purpose</b>	To use a garment for a new application. For example, a shirt formerly worn to work is worn when gardening, a worn-out t-shirt is cut up for rags.
<b>Responsibility</b>	Moral, legal, or mental accountability. (Macquarie Dictionary definition)
<b>Sustainability</b>	For the purposes of this study, sustainability is interpreted through Fry's alternative definition, 'sustain-ability', "A means to secure and maintain a qualitative condition of being over time [...] a process (rather than an end point) where in all that supports and extends being exceeds everything that negates it."

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## KEYWORDS

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Sustainable fashion,  
Fashion design,  
Garment lifetime,  
Clothing practices,  
Design for longevity,  
Redirective practice,  
Mutual responsibility

## ABSTRACT

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This research explores garment design for extended use by re-evaluating its potential to enable practices of sustainability in fashion. A review of existing literature and practices reveals that current industry approaches to sustainability continue to focus on improving the eco-efficiency of products and supply chains. The main argument presented is that a fashion garment, regardless of its sustainable production and manufacture, is rendered unsustainable when purchased and discarded prior to the end of its useful life. Leading researchers within the field have been calling for greater consideration of the use of garments in fashion design for sustainability strategies, advocating design for extended use, to mitigate the harmful environmental consequences of disposable fashion. Life-cycle analysis has been a signature method within the area of sustainable design and has been critical in situating the environmental impacts of products during production, use and disposal. While advancements have been made in the area of sustainable production, design for sustainability within the use phase of the garment life cycle remains under-explored. This study therefore seeks to respond to the question: What if a fashion garment could enable its own longevity through design?

The researcher employs qualitative and quantitative research methods including a literature and practice review, survey of consumer practices, and practice-based investigations to inform the development of conceptual diagrams and to propose a framework for doing sustainable design that form the main outcomes of the thesis. The review of literature and practice establishes the field of research as comprising fashion design practice and sustainable design methods and theory. A survey of consumer clothing practices extends this review. Practice as a method is used to advance the emerging findings of the review culminating in the development of innovative garment prototypes with the potential to script their own longevity. Practice as a method has been used to generate new knowledge, not merely new artefacts. The outcomes of the practice investigations encapsulate the major contributions of the thesis. Methods of reflective practice and action research have enabled the development of a revised garment lifetime diagram and a values-based framework for practicing sustainability in fashion. The research findings culminate in a proposed conceptual framework of mutual responsibility that recasts the designer and wearer as custodians of the garment during its lifetime by positioning the garment at the nexus of a reciprocal relationship. This positioning opens up new possibilities for fashion design for sustainability by drawing attention to the potential agency of the garment to enable responsible clothing practices of extended use. The capacity to change current attitudes and practices for sustainable design is argued by changing the focus from adoption of toolbox strategies to one based on the principles of shared responsibility.

# 1 INTRODUCTION

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This thesis argues sustainable fashion practice as a mutual responsibility shared by producers and consumers within the garment life cycle. The key research question is: How can designers and wearers of fashion share the responsibility to ensure a garment's enduring sustainability? The topic of fashion design for sustainability has been a focus for many researchers within the discipline over the past three decades. Utilising the work of well-known researchers in the field as a starting point, this study will confirm that current practice continues to focus on improving the eco-efficiency of products and supply chains as a means of enacting sustainability. Similarly, life cycle analysis has been used a signature method within the area of sustainable design and has been a critical measure of research into the environmental impacts of products during production, use and disposal. However, a re-examination of existing models reveals where the production and disposal of products have been explained in various distinct sub-phases, the use phase – the longest in the life cycle – appears at a single level. Further, the existing models do not depict any variance between the duration or impact of each phase. Defining the distinct sub-phases of use provides scope for more targeted solutions to extend the overall use phase. More recently, several qualitative studies into clothing use practices have provided a deeper insight into consumer behaviours beyond the shop floor. In addition, a review of historical clothing and practices supports the value of arguments for the recontextualisation of existing methods of design for sustainability. An examination of these and other areas through literature and contextual review and practical experimentation, will reveal the garment as an artefact with the potential to script its own longevity.

The first part of this thesis focuses on

- identifying the garment life cycle as the contextual framework for sustainable fashion design practice,
- arguing that garments have only one lifetime, irrespective of whether they change ownership,
- examining the relationship between activities within the design and use phases of the single garment lifetime.

The body of the thesis explores

- the capacities of fashion garments to enable sustainable clothing practices for long-term use,
- resources and networks to support the adoption of sustainable clothing practices,
- the consequent redirection of fashion practice (both as the profession of fashion design and the experience of dressing fashionably).

The outcomes of the thesis are:

- the proposal of a revised garment lifetime model with temporal proportionality and inclusive of sub-phases of use
- the proposal of a values-based framework of 'mutual responsibility' to describe the shared accountability of custodians across the garment lifetime to practice fashion with 'sustainability.'

In order to do this, the thesis is divided into three sections. The first part contextualises the study through a review of existing literature and practice. The second part uses creative design practice as a method to further explore the potential of existing practice, from various disciplines, within a fashion context and to explore innovative as well as historical strategies to design for extended use. The action research involved an evaluation of existing toolkits and manuals on how to do sustainable fashion design, both theoretical and through practice. This section forms the body of the thesis and provides the individual cases to support the original contributions made through this research. The final section clearly outlines these contributions as a revised garment lifetime model and a values-based framework for practicing fashion design for sustainability. The decision to adopt design practice as a key method has also resulted in a new resource for designers to assist in the redirection of practice for sustainability.





FIGURE 1.1. THE BIRD DRESS

## 1.1 THE BIRD DRESS: A BRIEF BACKGROUND TO THE STUDY

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The catalyst for this research study is a particular dress I own, *The Bird Dress* (Figure 1.1). I don't remember exactly when I bought *The Bird Dress*, but I recall it was when I was an undergraduate fashion student, so it would have been around 2001. I bought it at a vintage boutique on Brunswick St. in Melbourne that I visited occasionally, mostly to window shop since it was rather more expensive than the charity shops I frequented regularly. I remember that it was \$48AUD which was quite a lot more than the \$20AUD I would usually spend on a second-hand dress. The dress was made in Japan, by an unfamiliar brand. It is made from black polyester georgette, printed all over with small brown birds in flight. The style is simple: a straight skirt, pleated and elasticated at the waist, a wrap front bodice with a kimono style short-sleeve cut in one with the body. A belt made of the same fabric with a black and gold coloured metal buckle is held in place at the side seams with hand worked thread chains. The skirt is lined, but the bodice is not, so it requires a slip underneath. Although it is a vintage garment, the cut of the dress might be described as 'classic' and maintains contemporary appeal. In fact, it is difficult to tell if it was made in the 1970s or 1980s. The print is unusual in design and technique and being of high quality has withstood wash and wear well over time. As a result of its design, fabric and construction, the dress still looks to be in its original condition.

*The Bird Dress* appeals to me as a physical artefact: I appreciate the design of dress, its feel and look on my body and in my reflection. The reason I can wear it more than 15 years later is perhaps due to a number of decisions made at the time of its design and manufacture that have resulted in a robust but adaptable garment that has kept pace with the fashions changing around it. The pleated bodice, wide armholes, elasticated waistline and generous skirt are design features of the style but have also comfortably accommodated small changes in my body shape over time. Its methods of construction and the durable, easy care fabric from which it has been made have enabled me to alter it in small ways. Over the years I have adjusted the length of the belt, taking it in and letting it out at different times, I have re-stitched the hem, and I have replaced the perished waistband elastic with a longer piece. These simple alterations have kept the garment in good condition and ensured it has remained a comfortable fit. The style of the garment remains unchanged. I have not shortened its knee length skirt or chopped off its already short sleeves. It is important to note that the three actions described here rely on one basic, easily mastered skill: hand stitching with a needle and thread. *The Bird Dress* story suggests that a combination of the decisions made at the time of its design and the skillset of the wearer is essential for any potential strategy for extended use. The actions I have taken to keep this dress alive form the basis of my research practice and have helped structure the design of my study for *The Living Wardrobe* as a different way of approaching and building sustainable practice in fashion and design.

I also have strong emotional connections to this dress. After years of wear it is a familiar friend although I do not associate it with any one particular memory. In hindsight, I realise the purchase of *The Bird Dress* marked a pivotal time in my life. After a decade immersed in the Gothic subculture, a black dress printed with a pattern of brown birds marked the transition to a new fashion identity; in *The Bird Dress* I glimpsed a new version of myself. This was significant in illuminating the power a fashion garment has to initiate change. In this case, the change was aesthetic and marked the beginning of a lifestyle change as my tastes and interests extended beyond the familiarity of the Goth scene. Buying the dress was one thing, but wearing the dress was another. I remember wondering as I took it to the shop counter if I weren't making an expensive mistake. However, the decision was quickly validated by the compliments it solicited. The combination of the physical garment, the act of wearing and external endorsement by fashion savvy peers, repositioned the dress within a renewed and contemporary fashion context. This is important because the connection between me as the wearer and *The Bird Dress* as the garment were central to enabling the repositioning of a second-hand dress within a fashion context. This observation has informed my research by raising questions such as: Can a garment be fashionable more than once? What factors contribute to reinstating a garment within a contemporary fashion context? Can longevity be considered as a valid strategy in developing fashion design for sustainability? Further questions arise around what deliberate actions designers and consumers can take to enable enduring garment relationships across the lifetime of the garment?

Like other designers, I have a number of garments in my wardrobe that I keep because they are beautiful, but I will not be able to wear them again. Some are old and now too delicate to wear, others simply no longer fit comfortably. Many are charity shop treasures: lucky finds and bargains. My second wardrobe has become a library of these garments I cannot part with, and that I would still wear, if they let me. I still enjoy these garments immensely, but only to look at, no longer to wear. They hang in my wardrobe like books on the shelf of a library, pulled out as references from time to time. They are not

particularly high-quality garments, nor are they designer labels. Their value is personal and not directly connected to their original cost, brand or their position within the fashion system. While the fabrication and construction of a garment are important aspects of design, they are often secondary to the overall visual appearance within contemporary fashion. If these garments prevent me from wearing them because of the way they have been designed, could their design alternatively have enabled me to continue wearing them? With no way of knowing if *The Bird Dress* was deliberately designed to be modified, easy fitting and long lasting, I began to wonder if it had been, and if the other garments I own and want to keep wearing could be re-animated in similar ways? I began to ask questions like, what if it had been? What if the other garments I own and want to keep wearing could be re-animated in similar ways?

My enduring relationship with *The Bird Dress* is a consequence of my capabilities in making garment alterations and my willingness to engage with fashion beyond the fast fashion rack. These capabilities come from my upbringing, rather than my formal fashion design education. As a family, we were actively engaged with our material surroundings, my parents were always maintaining, repairing and making things around the house. Sewing to repair clothing and household textiles was a domestic chore, something I assumed everyone did at home. I was taught to use things with care and when something new was needed, purchase the best possible quality so that it would last. It is perhaps because of my upbringing that second-hand shopping appeals so much: a means to create an individual identity without the compromise of buying poor quality new things because of budget constraints (as an undergraduate university student I could afford a second-hand designer dress, but not a new one). Had I not been able to identify within *The Bird Dress* the opportunity for alteration and had I not the simple hand sewing skills to undertake repairs, then the dress might hang with the others unworn in my second wardrobe. A few simple skills can go a long way to extending the useful life of a garment. The capability to identify and alter a garment to suit changes to an individual figure or changes in taste, is essential to action any affordances to do so the garment may have. This observation has directly informed the study. I speculated: what distinguishes a garment with the capacity for repair or alteration from those without? What are the essential skills for garment alteration? Given sewing is rarely learnt at home or school, where is such know-how acquired in contemporary society? I further wondered what agency garments might have to deliver such skills? What support wearers might require taking up new skills for extending the life of fashion garments?

The conception of fashion as the on-going engagement with the garments of the wardrobe, describes fashion as a social practice of wearing clothing to present a fashionable appearance.<sup>1</sup> This is in contrast to the prevalent understanding of fashion as the constant acquisition of new garments (fast fashion).<sup>2</sup> Through actions like buying second-hand fashion and making alterations to garments, participation in fashion extends beyond the adoption of the current trend to include fashion as the capacity of the wearer to create fashion looks.<sup>3</sup> Situating fashion within its social context of daily dressing, highlights

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1. Sophie Woodward, "Accidentally Sustainable? Ethnographic approaches to clothing practices," in *Routledge handbook of sustainability and fashion*, ed. Kate Fletcher and Mathilda Tham, Routledge international handbooks (Abingdon, Oxon ; New York, NY: Routledge,, 2015).

2. Holly McQuillan, "Zero Waste Design Practice Strategies and Risk Taking for Garment Design," in *Shaping Sustainable Fashion: Changing the Way We Make and Use Clothes*, ed. Gwilt Alison and Rissanen Timo (Taylor and Francis, 2012).

3. Kate Fletcher, "Exploring demand reduction through design, durability and 'usership' of fashion clothes," *Philosophical Transactions of the*

the need to design sustainable garments for sustainable wearing: including in the design process anticipated modes of use and re-use and deliberately designing to enable a multitude of possible futures within which garments persist as, or are re-made as, fashion. This too seems at odds with fashion understood as the insatiable thirst for novelty. Alternatively, it suggests a less resource-intensive way to satisfy the same needs by extending the circulation of fewer garments. Might actions that extend the use of a garment for one wearer re-animate a discarded garment for another?

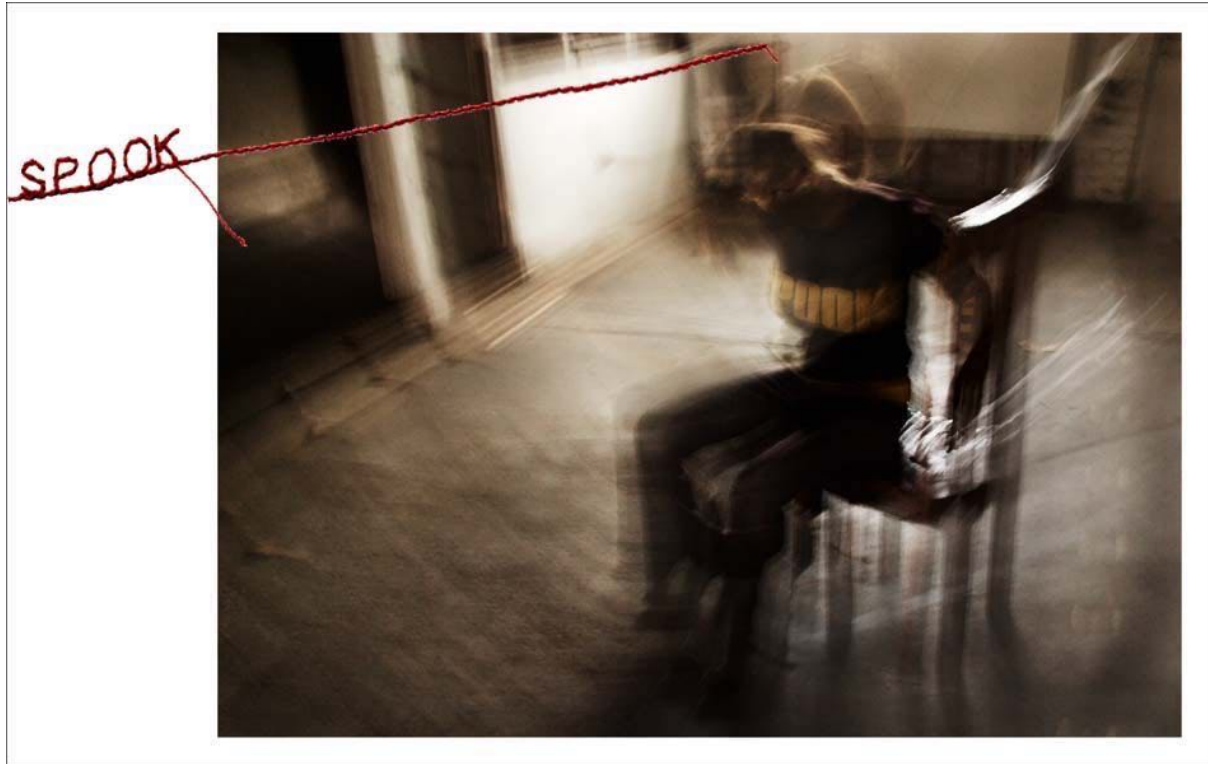


FIGURE 1.2. PROMOTIONAL IMAGE, SPOOK, WINTER 2004 SEASON. PHOTOGRAPH BY PAUL ALLISTER

*The Bird Dress* story is included here to provide a sense of the researcher's background as a consumer, prior to undertaking formal study in fashion design and commencing a career as a fashion designer. This is important because it is both the experience of being a fashion consumer and a fashion practitioner that has informed this study. Not long after I purchased *The Bird Dress*, I completed my bachelor's degree in fashion at RMIT University, following which I accepted a position as design assistant then production manager for independent local Melbourne fashion brands.<sup>4</sup> In 2004 I started the label *Spook*, that I co-owned with a business partner (Figure 1.2). Although *Spook* was tremendously rewarding in many ways, the hectic pace of the seasonal wholesale calendar became quickly overwhelming, leading me to question the sustainability of the industry and the place I wanted to take in it. Of particular concern became the issue of excess, unsold stock. Despite producing

*Royal Society A: Mathematical, Physical and Engineering Sciences* 375, no. 2095 (2017), <https://doi.org/10.1098/rsta.2016.0366>

4. Claude Maus has since closed however Obus is still in business.

collections in quantities to match wholesale orders, invariably after only a few weeks in store at full price, the last pieces would be discounted ahead of the new season's arrival. Not only was this disheartening to acknowledge, given the months of work behind it, it also prompted me to ask, where does it all go? Following this, I had the opportunity to work as a lecturer in the School of Fashion and Textiles at RMIT University and to critically reflect on the values, methods and outcomes of fashion practice. Away from the financial constraints of maintaining a commercial practice, I am able to rethink my role as a fashion designer in response to my growing concerns about my responsibility for fashion's complicity in our defuturing.<sup>5</sup>

At the commencement of this research project I identified that my fashion practice was in a problematic situation of unsustainability. I began questioning whether the model of fashion design practice I had studied at university – and that I now know is widely practiced in the both the local and global fashion industry – is inherently unsustainable. This framed the problem as systemic, and therefore directed my research to examine my practice in its broader context. The disconnect I felt between the institutional model of engagement with fashion clothing I had learnt, and my own careful practices of acquiring and wearing clothes to be fashionable, I recognised as symptomatic of the broader challenge of practicing fashion sustainably. Although my garment maintenance practice was not motivated by deliberate considerations of sustainability, the occasional renewal of *The Bird Dress* suggested unrealised potential in the capacity of a garment to support sustainable fashion practices of enduring garment use. This potential warranted exploration through practice, to investigate how existing strategies of sustainable fashion design and production might be extended to give greater consideration to use.

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5. Fry defines 'defuturing' as destructive, anthropocentric thinking and actions that prioritise short-term gains over the future viability of the human and natural world. Tony Fry, *A new design philosophy: an introduction to defuturing* (Sydney: UNSW Press, 1999).

## 1.2 TOO MUCH OF A GOOD THING: THE PROBLEM OF EXCESS IN THE FASHION SECTOR

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Fashion clothing is being produced in excess of consumption. In early 2018, H&M revealed they are carrying US\$4.3 billion of unsold stock<sup>6</sup> and Burberry admitted to burning GB£150 million of unsold stock.<sup>7</sup> The fashion industry accounts for 2% of the world's Gross Domestic Product,<sup>8</sup> achieving US\$1.34 trillion in retail sales per year.<sup>9</sup> These sales figures are projected to grow significantly over the next few years, increasing by 13% in 2021, attributed largely to the growing middle classes in China and India.<sup>10</sup> Yet the value of the market is only anticipated to grow by 8%, indicating an increase in low value goods, i.e. fast fashion.<sup>11</sup> Over-production directly relates to over-consumption. The average Australian buys 27kg of new clothing and other textiles per year, twice the global average.<sup>12</sup> In Australia, designer brands and budget brands alike have outlet stores for overruns. Inner-city shopping strips have become destinations for shopping at factory outlets (in Melbourne's inner-city area alone there is Smith St. in Collingwood and Bridge Rd. in Richmond) and there are shopping malls devoted to discount shopping: Direct Factory Outlets. Clothing is being produced in excess of consumption, and the rate of purchasing is being driven in line with the availability of new product. While researchers often recognise fast fashion as the problem, industry solutions focus on adjustments to current industry supply chain practices to meet compliance. A more enduring solution is instead to focus on developing sustainable solutions for implementation within the garment use phase.

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6. Elizabeth Paton, "H&M, a Fashion Giant, Has a Problem: \$4.3 Billion in Unsold Clothes," *The New York Times* (New York), 27 March 2018, Business Day, <https://www.nytimes.com/2018/03/27/business/hm-clothes-stock-sales.html>.

7. ABC News, "Burberry burns unsold products and not everyone is buying why," ABC News, updated 21 July 2018, 2018, accessed September 13, 2018, <http://www.abc.net.au/news/2018-07-20/fashion-brand-burberry-defends-burning-of-unsold-products/10019328>.

8. Fashion United, "Global fashion industry statistics - International apparel," 2018, accessed November 17, 2018, <https://fashionunited.com/global-fashion-industry-statistics/>.

9. Common Objective, "Volume And Consumption: How Much Does The World Buy," 14 May, 2018, accessed November 17, 2018, <https://www.commonobjective.co/article/volume-and-consumption-how-much-does-the-world-buy>.

10. Alasdair Carmichale, "Man-Made Fibers Continue To Grow," *Textile World*, February 3, 2015, accessed October 10, 2018, <https://www.textileworld.com/textile-world/fiber-world/2015/02/man-made-fibers-continue-to-grow/>.

11. Common Common Objective, "Volume And Consumption: How Much Does The World Buy."

12. Fiona Pepper, "Australia's obsession with new clothes and 'fast fashion' textiles hurting the environment," ABC News, January 12, 2017, accessed October 1, 2018, <https://www.abc.net.au/news/2017-01-12/australias-obsession-with-new-clothes-hurting-the-environment/8177624>.





FIGURE 1.3 CLOTHING RECYCLING BIN AT NEWMARKET PLAZA, MELBOURNE, 2017.

LOCATED ON THE EDGE OF A CAR PARK BETWEEN A TRAIN STATION AND A SUPERMARKET, THIS CLOTHING RECYCLING BIN IS A SITE OF CONSTANT DUMPING.

### 1.3 FAST FASHION

Prolonging the use of garments is imperative to reducing the waste problem generated by unwanted clothing. Nationally, it is estimated that a total of 6000 kg of clothing is dumped into landfill every ten minutes.<sup>13</sup> The charity sector in Australia receives one million tonnes of donated clothing and household goods per year,<sup>14</sup> including quantities of unworn overrun production fashion clothing (Figure 1.3). In New South Wales, The Smith Family processes annually 13 million kg of clothing at just one facility. Of this, the highest quality garments (3-4%) are resold locally through their network of charity shops, a further 60% is baled and sold by the tonne for export to developing countries,<sup>15</sup> and 5%-10%

13. Mark Middis, "War on Waste Part 3: Coffee Cups and Fast Fashion," in *War on Waste*, ed. Mark Middis (Australia: Australian Broadcasting Corporation, 2017). <http://www.abc.net.au/tv/programs/war-on-waste/>.

14. The National Association of Charitable Recycling Organisations, "Fast Facts About Charitable Recycling," 2018, accessed September 18, 2018, <http://www.nacro.org.au/wp-content/uploads/2018/01/NACRO-Fast-facts-for-website.pdf>

15. During the financial year 2016-2017 Australia exported 93,502,966 kilos of "worn clothing and other worn textile articles" with a declared value of \$72,980,420, of which direct exports from charities is reported to be two thirds. Kerryn Caulfield, "Exports of Worn Clothing And Other Worn Textile Articles", The National Association of Charitable Recycling Organisations, 2017, accessed October 10, 2018,

is sold for industrial rags. The remainder, estimated to be 30% (26-32%) comprising soiled and worn-out textiles too degraded for recycling, goes to landfill, at a cost to the charity of nearly AU\$1 million dollars per year.<sup>16</sup> Both the Smith Family and the Salvation Army have noted the diminishing quality of donated fashion clothing, unsuitable for re-use.<sup>17</sup> These "flimsy" garments are the product of the fast fashion system that produces garments quickly and cheaply for short-term use: fashion-forward styles that are relevant to the prevalent tastes for a season or two, then discarded in favour of newer styles. This means that although the consumer behaviour is commendable in donating them, the garments are unable to be re-used.

Fast fashion is a recent phenomenon that has evolved since the 1970s through improvements to industrial supply chain management (just-in-time manufacturing), the reduction of global trade tariffs and the rapidly expanding manufacturing capacity of China. The global dissemination of new fashion ideas and products has accelerated from a six-monthly cycle of spring/summer and autumn/winter collections, to a continual drip feed of new products into store throughout the year. At the time of writing, fast fashion works on a two to eight-week delivery cycle.<sup>18</sup> Trends still trickle down from the haute couture runways but are just as likely to trickle back up from the street via social media.

As production has increased and retail price points have dropped, the consumption of fashion garments has increased significantly. The largest group of consumers of fast fashion are women of the 'millennial' generation (born between 1981 and 1996), for whom the definition of fashion 'value' has shifted from quality and durability to bargain pricing.<sup>19</sup> When garments are valued in economic terms over performative qualities they are more readily discarded. Research undertaken in Australia shows that in comparison to the baby boomer generation (those born between 1946 and 1965), millennials are more likely to discard clothing for reasons of fashion change and boredom than problems with fit or faults.<sup>20</sup> Compared to older generations, millennials discard unwanted garments more quickly and are more likely to throw them in the bin instead of donating them to charity.<sup>21</sup> With the Australian population set to reach 37.6 million in 2050,<sup>22</sup> a significant waste problem looms. This indicates that there is potential in revisiting past behaviours for the next generation of fashion consumers.

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<http://www.nacro.org.au/wp-content/uploads/2018/02/Export-Trade-data.pdf>.

16. Middis, "War on Waste Part 3: Coffee Cups and Fast Fashion."

17. Clare Press, "Sustainable Style: What happens to the clothes you donate to op shops?," *Sydney Morning Herald* (Sydney) 2017, Home/Lifestyle/Fashion., Middis, "War on Waste Part 3: Coffee Cups and Fast Fashion."

18. McQuillan, "Zero Waste Design Practice Strategies and Risk Taking for Garment Design."

19. Alexandra Spring, "Landfill becomes the latest fashion victim in Australia's throwaway clothes culture," *The Guardian*, 6 December 2017, Lifestyle, <https://www.theguardian.com/fashion/2017/dec/06/landfill-becomes-the-latest-fashion-victim-in-australias-throwaway-clothes-culture>.

20. YouGov AU, "Fast fashion: Three in ten Aussies have thrown away clothing after wearing it just once," updated December 6, 2017, 2017, accessed September 13, 2018, <https://au.yougov.com/news/2017/12/06/fast-fashion/>.

21. YouGov YouGov AU, "Fast fashion: Three in ten Aussies have thrown away clothing after wearing it just once."

22. Christopher Joye, "Why Australia needs to get real on population growth," *Australian Financial Review*, updated 2 December 2013, November 30, 2013, accessed September 18, 2018.



### 1.3.1 SUPPLY CHAIN SOLUTIONS

Efforts to improve the negative impacts of the fashion sector have primarily focused on the supply chain, for which less harmful substitutes have been sought for existing materials and processes. In Gardetti and Torres' diagram, (Figure 1.4) the conventional fashion and textiles supply chain is elaborated upon by inclusion of the ecological impacts of each stage.<sup>23</sup> Making visible the stages and impacts of the fashion and textiles supply chain provides opportunity for analysis to introduce eco-efficiencies, as has been the priority of sustainable development in seeking to make the production supply chain "less-bad."<sup>24</sup>

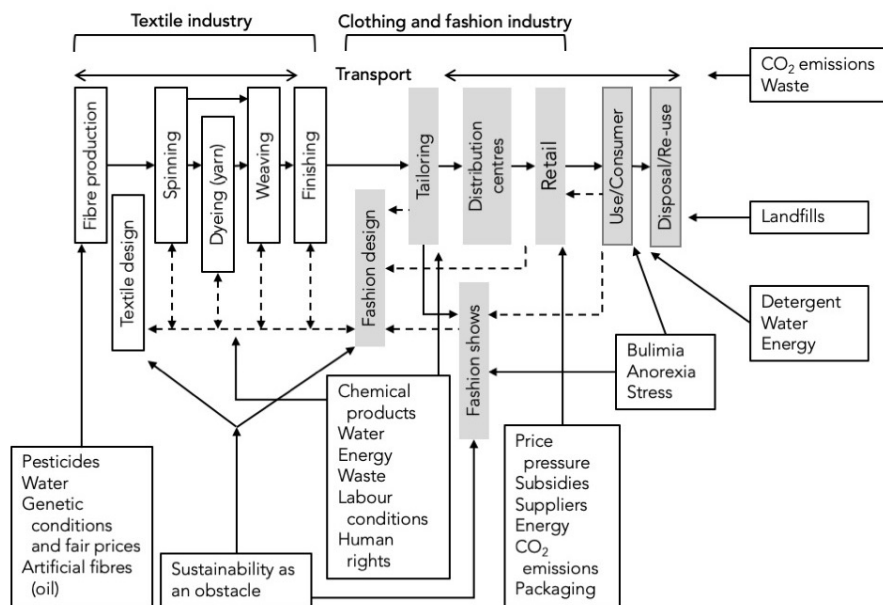


FIGURE 1.4. DIAGRAM OF THE ENVIRONMENTAL AND SOCIAL IMPACTS OF THE TEXTILE, CLOTHING AND FASHION INDUSTRY (AFTER GARDETTI AND TORRES)

The negative environmental and social consequences of the fashion supply chain are well known to producers and consumers alike. The production of both natural and man-made textiles depletes natural resources and pollutes the environments in which they are made and into which they are disposed.<sup>25</sup> The manufacture of garments has long been associated with the exploitation of workers in developing countries who work long hours for sub-standard pay in poor conditions.<sup>26</sup> Efforts to improve

23. , p.7Miguel Angel Gardetti and Ana Laura Torres, *Sustainability in Fashion and Textiles: Values, Design, Production and Consumption*, ed. Miguel Angel Gardetti and Ana Laura Torres (Sheffield: Greenleaf Pub., 2013).

24. William McDonough and Michael Braungart, "Cradle to cradle: remaking the way we make things," (2002), p.45

25. Common Objective, "Fashion's Impact on the Planet," June 8, 2018, accessed September 18, 2018, <https://www.commonobjective.co/article/fashion-s-impact-on-the-planet>.

Janet Hethorn and Connie Ulasewicz, *Sustainable fashion - why now?: a conversation exploring issues, practices, and possibilities* (New York, Oxford: Fairchild, 2008),

David McIlvrde, "River Blue," (2018),

Andrew Morgan, "The True Cost," (United States: Untold Creative, 2015).

26. Oxfam, *What She Makes: Power and poverty in the fashion industry*, Oxfam Australia (2017), <http://whatshemakes.oxfam.org.au/wp->

the negative impacts of the fashion sector have primarily focused on the supply chain, for which less harmful substitutes have been sought for existing materials and processes.<sup>27</sup> Advances in fibre and textile production include the development of low energy use fibres, fibres and textiles that take less water to grow and manufacture, an increase in the production of organic and non-GMO crops, recyclable and biodegradable fibres and fabrics, fabrics produced partly or entirely from recycled fibres, both pre- and post- consumer waste.<sup>28</sup> Fabric agencies like The Sustainable Angle promote and make available these alternatives by curating and presenting annual collections to the industry.<sup>29</sup> Accreditation programs like the Higg Index<sup>30</sup> and STeP by OEKO-TEX®<sup>31</sup> regulate improved models of industry practice across the supply chain and offer consumers verification that their purchase is true to its claims of sustainability. Industry groups have formed to develop their own voluntary codes of conduct, particularly in relation to workers' rights.<sup>32</sup> At the same time, innovative brands are taking it upon themselves to make transparent to consumers their supply chain and even their garment costing<sup>33</sup> and retail boutiques are establishing their own criteria for curating collections of 'sustainable' fashion for sale.<sup>34</sup>

Supply chain improvements are critical to meeting sustainability objectives as are improved recycling options for discarded products. However, patching the existing linear economic model of 'take, make, waste' is insufficient to solve the planetary impacts of a rapidly growing population with a lust for stuff. In 2017, humans used 1.7 times the natural resources than the Earth can regenerate in a year, extending and increasing the overdraft begun in 1971.<sup>35</sup> Kate Fletcher has discussed how the "prevailing ways of thinking lock us into particular ideas about the shape and practices of the fashion sector. So while the effects of growth (fast) fashion are often portrayed as undesirable, solutions tend to be couched as extensions and/or modifications of these undesirable practices and the status quo."<sup>36</sup> This, she contends, prevents any real scrutiny or challenge to established systems and whether they can "actually lead to social and ecological richness and satisfaction."<sup>37</sup> Fletcher's comments point to the need to seek alternative ways of engaging with fashion that are less resource intensive and wasteful.

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content/uploads/2017/10/Living-Wage-Media-Report\_WEB.pdf.

27. Kate Fletcher and Lynda Grose, *Fashion & sustainability: design for change* (London: Laurence King, 2012).

28. Fletcher and Grose, *Fashion & sustainability: design for change*.

29. The Sustainable Angle, "8th Future Fabrics Expo 24 - 25th January 2019," 2017, accessed October 12, 2018, <https://thesustainableangle.org/future-fabrics/>.

30. Sustainable Apparel Coalition, "The Higg Index," accessed March 17, 2018, <https://apparelcoalition.org/the-higg-index/>.

31. OEKO-TEX, "STeP by OEKO-TEX®," accessed March 15, 2018, [https://www.oeko-tex.com/en/business/certifications\\_and\\_services/step\\_by\\_oeko\\_tex/step\\_start.xhtml](https://www.oeko-tex.com/en/business/certifications_and_services/step_by_oeko_tex/step_start.xhtml).

32. See for example the Clean Clothes Campaign, "Accord on Fire and Building Safety in Bangladesh," May 12, 2013, accessed October 10, 2018, <https://cleanclothes.org/img/pdf/accord-on-fire-and-building-safety-in-bangladesh>.

33. Bruno Peiters, "Honest By," 2012, accessed October 10, 2018, <http://www.honestby.com/>.

34. See for example, Courtney Sanders and Kelly Elkin, "Well Made Clothes," 2016, accessed 20 January, 2019, <https://wellmadeclothes.com.au/>.

35. Global Footprint Network, "Ecological Footprint," accessed October 3, 2018, <https://www.footprintnetwork.org/our-work/ecological-footprint/>.

36. Kate Fletcher, "Slow Fashion: An Invitation for Systems Change," doi:10.2752/175693810X12774625387594, *Fashion Practice: The Journal of Design, Creative Process & the Fashion Industry* 2 (2010), p.263

37. Fletcher, "Slow Fashion: An Invitation for Systems Change.", p.263

### 1.3.2 SLOW FASHION

Emerging from the slow design movement of the mid 2000s, and with parallels to the slow food<sup>38</sup> movement of the 1980s, 'slow fashion' describes fashion produced with alternative values and methods to those of fast fashion. Hazel Clark defines the principles slow fashion as fashion that demonstrates: concern for local resources and distributed economies; transparent production systems with less intermediation between producer and consumer; and sustainable and sensorial products that have a longer usable life and are more highly valued than typical "consumables."<sup>39</sup> Fletcher supports her further argument to stress that slow fashion is not merely fast fashion slowed down.<sup>40</sup> Instead, slow fashion represents an opportunity to rethink fashion as both a production system, and further as a system of values. For Fletcher:

*Slow fashion represents a vision of sustainability in the fashion sector based on different values and goals to the present day. It requires a changed infrastructure and a reduced throughput of goods. Categorically, slow fashion is not business-as-usual but just involving design classics. Nor is it production-as-usual but with long lead times. Slow fashion represents a blatant discontinuity with the practices of today's sector; a break from the values and goals of fast (growth-based) fashion. It is a vision of the fashion sector built from a different starting point.<sup>41</sup>*

Fletcher's vision of slow fashion can be read as a definition that seeks to correct the existing misconceptions around slow fashion held by consumers and producers alike. Confusion around the term and its misuse as a marketing angle for garments produced with spurious claims to sustainability, is one of the contributing reasons a call has been made for the formation of a Responsible Fashion Council to regulate global industry practices and promote sustainability across the sector.<sup>42</sup> This provides an example of the need for clarity around common definitions within the field of fashion design for sustainability. Slow fashion endorses a rethink of fashion as a production system but also as a values system which over the last decade has led to an examination of how the desire for fashion might be satisfied in less materialistic ways.<sup>43</sup> These approaches emphasise the durability of emotional relationships between consumers and products as a means of reducing consumption whilst pointing out the elusiveness of designing products to bring about such relationships.<sup>44</sup> This suggests that design strategies that are likely to increase the bond between wearers and garments have the potential to enrich definitions of fashion beyond either fast or slow fashion.

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38. The 'slow food' movement began in Italy in the mid 1980s as a reaction to the encroachment of fast food chains on the national cuisine. Slow food champions healthy home cooking with quality ingredients and the social benefits to family and community of cooking and eating together.

39. Hazel Clark, "SLOW + FASHION an Oxymoron or a Promise for the Future?," *Fashion Theory: The Journal of Dress, Body & Culture* 12, no. 4 (2008), <https://doi.org/10.2752/175174108X346922>

40. Fletcher, "Slow Fashion: An Invitation for Systems Change," p.264

41. Fletcher, "Slow Fashion: An Invitation for Systems Change," p.262

42. Xenya Cherny-Scanlon and Kristin Agnes, "Time for a Responsible Fashion Council?," in *Green Fashion* ed. S.S. Muthu and M.A. Gardetti, Environmental Footprints and Eco-design of Products and Processes (Singapore: Springer, 2016).

43. Kate Fletcher, *Sustainable fashion and textiles: design journeys* (London ; Sterling, VA: Earthscan, 2008).

44. Jonathan Chapman, "Design for (Emotional) Durability," *Design Issues* 25, no. 4 (2009)

## 1.4 SUSTAINABLE FASHION PRACTICES

In line with existing research in fashion and textile sustainability, both designers and consumers demonstrate a desire to engage with more sustainable practices.<sup>45</sup> This has led to many and varied models of sustainable fashion practice from design methodologies to consumer driven approaches. Changes to retail practices and new business opportunities include: re-making garments into new fashions,<sup>46</sup> re-selling/take back schemes for unwanted garments,<sup>47</sup> transparency around end-of-life scenarios for returned garments,<sup>48</sup> customisation,<sup>49</sup> clothing swap schemes,<sup>50</sup> new sharing services,<sup>51</sup> a renewed market for formal wear hire<sup>52</sup> and bespoke made-to-measure.<sup>53</sup> Widespread consumer-led approaches include: buying second-hand, re-making garments, a resurgence in 'mend and make do' practices of garment repair, home garment production, and clothes sharing and swapping. In turn this has led to an increase in fashion activism through which consumers are demanding more information about the environmental impacts and labour conditions with which fashion is produced.<sup>54</sup>

These initiatives are increasing social engagement with sustainable fashion practices to extend the garment use phase. However, currently garments are not designed for extended use and re-use. This particularly limits their suitability to the various consumer-led sustainable fashion practice strategies listed above. Alongside increasing the original quality of the garment (materials and manufacture), the real opportunity is to begin to design for these practices in the first instance: garment longevity in support of social engagement. This leads to the research question that lies at the core of this thesis, how might a garment be designed to enable its own longevity?

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45. Kirsí; Hårvik Laitala, Marthe Austgulen; Klepp, Ingun Grimstad, "Responsibility without means," in *Roadmap to Sustainable Textiles and Clothing: Environment and social aspects of textiles and clothing supply chain*, ed. Subramanian Muthu (Hong Kong: Springer, 2014)., Kerli Kant Hvass, "Post-retail responsibility of garments – a fashion industry perspective," *Journal of Fashion Marketing and Management: An International Journal* 18, no. 4 (2014), <https://doi.org/doi:10.1108/JFMM-01-2013-0005>

46. Annika Seager and Kerry Sanders, "Junky Styling," 1997, accessed January 19, 2011, <http://www.junkystyling.co.uk/>.

47. Filippa K, "Filippa K Collect," accessed October 10, 2018, <https://www.filippa-k.com/int/filippak-world/collect>.

48. H&M Group, "Recycle Your Clothes," accessed October 10, 2018, <https://about.hm.com/en/sustainability/get-involved/recycle-your-clothes.html>.

49. "eShakti," accessed September 18, 2018, <https://www.eshakti.com/>.

50. Orpheux Design, "Rehash Clothes," 2007, accessed January 25, 2019, <https://www.rehashclothes.com/>.

51. "Cursty," 2015, accessed September 18, 2018, <https://curtsyapp.com/>.

52. "Rent The Runway," 2009, accessed September 18, 2018, [renttherunway.com](http://renttherunway.com).

53. Captains of Industry, "Captains of Industry," 2009, accessed February 1, 2011, <http://captainsofindustry.com.au/>.

54. "Fashion Revolution," 2014, accessed September 18, 2018, <https://www.fashionrevolution.org/>.

## 1.5 STRUCTURE OF THE THESIS

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Following the introduction, Chapter 2 forms the literature and contextual review, dealing with the key concepts and existing models of practice surrounding the study as well as establishing a community of practice across multiple design disciplines including various theorists and practitioners. The chapter expands on the research problem, current approaches to fashion design for sustainability to identify an existing gap in knowledge. Chapter 3 outlines the research design and research methodology for the study. A multi-method approach has been adopted as appropriate to creative practice research and professional fashion design practice. Chapters 4 and 5 detail practice-led experiments and initiatives that form the active research undertaken within this doctoral study. Chapter 4 details the prototyping for design experiments in which a series of garment samples test and refine the hypothesis of the thesis. The prototypes investigate the opportunities for a fashion designer to design for long life garments through scripting sustainable clothing use practices within the garment design and manufacture. Chapter 5 then extends the experimentation phase to develop innovative approaches to making available the know-how needed to act on the enduring capacities of the garment prototypes developed. Findings are discussed in detail in Chapter 6 which leads into the original and significant contributions of the thesis, namely that a reconceptualisation of the garment life cycle as a single lifetime enables an alternative values-based framework for practicing sustainable fashion, founded on 'mutual responsibility' for the garment lifetime.

## 2 MAPPING FASHION DESIGN FOR SUSTAINABILITY

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Research on the topic of fashion design for sustainability is a small but significant area of sustainable design research and an even smaller part of the existing body of research surrounding sustainability in general. The area is not new and has been one of significant contribution from fashion and textiles researchers since the mid 1990s. Therefore, there is a vast amount of existing theory and practice not all of which can be discussed within this thesis. This chapter approaches the various sustainability discourses in fashion theory through a process of mapping: where key theories, frameworks and strategies that have developed are laid out. Conducted throughout the research this process includes:

- Review of commonly used definitions of the concepts of fashion, design and sustainability
- Review of key readings in the field of design for sustainability from various disciplines to create an overview of this area of inquiry in theory and practice,
- Review existing literature and practice within the specific area of fashion research that engages with design for sustainability.

In turn, rather than present a linear account of the development of research surrounding the topic of fashion design for sustainability, the main concepts are presented as a series of varied and interesting research directions such as: fashion as distinct from design,<sup>55</sup> sustainability as the theoretical framework for both the practice of design,<sup>56</sup> and the lived experience of fashion.<sup>57</sup> These tangents have been critical to articulating the context of this study and to share the complexity of fashion research that is new and distinct but that also rests upon large amounts of research, both theory and practice, within a wide range of design disciplines. It is vital that this existing knowledge provide a framework for informing and refining the initial research questions of this study, informing the research methodology and to situate the research outcome where it will be of most benefit.

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55. Malcolm Barnard, *Fashion as communication*, 2nd ed. ed. (London: Routledge, 2002), Yuniya Kawamura, *Fashion-ology: an introduction to fashion studies* (Oxford, New York: Berg, 2005).

56. Sandy Black, *Eco-Chic: The Fashion Paradox* (Black Dog Publishing, London, UK, 2008), Fletcher, *Sustainable fashion and textiles: design journeys*.

Tony Fry, *Design futuring: sustainability, ethics, and new practice* (Oxford, UK; New York, NY: Berg, 2009).

Alison Gwilt and Timo Rissanen, eds., *Shaping Sustainable Fashion: changing the way we make and use clothes* (London; Washington, DC: Earthscan, 2011).

57. Alison Gill and Abby Mellick Lopes, "On Wearing: A Critical Framework for Valuing Design's Already Made," *Design and Culture* 3, no. 3 (2011/11/01 2011), <https://doi.org/10.2752/175470811X13071166525234>,

Alison Gwilt, "Valuing the Role of the Wearer in the Creation of Sustainable Fashion," *Research Journal of Textile and Apparel* 17, no. 1 (2013), Woodward, "Accidentally Sustainable? Ethnographic approaches to clothing practices."

While the gap between fashion theory and practice has narrowed over time, definitions of fashion are contested and there are several schools of thought around what constitutes fashion,<sup>58</sup> how is fashion different from clothing,<sup>59</sup> and if fashion is limited to fashion garments.<sup>60</sup> With this in mind, the leading concepts are presented to support the position taken for the purposes of this study of fashion as combination between fashion artefact, external validation, and the worn experience. Similarly, concepts of sustainability are discussed within the fashion discourse to reveal a prevalent view of fashion as a mass social and economic system.<sup>61</sup> An overview of existing strategies for sustainability within the fashion sector will demonstrate a similar emphasis for solutions tailored by and for larger players in the supply chain.<sup>62</sup> The chapter will also establish common ways of framing research paradigms including the methods of Life Cycle Assessment and Social Practices for sustainability.<sup>63</sup>

An overview of the different approaches to fashion design for sustainability also includes a review of different practice-led approaches including ethical fashion and slow fashion, as well as historical movements and practices that have relevance to developing more sustainable practice within the spectrum of fashion design. I argue that there needs to be an evaluation of current approaches to fashion design for sustainability, and that approaches not commonly applied to fashion need to be considered for the potential they offer to the discipline and to the largest part of the fashion industry in Australia, small and micro businesses.<sup>64</sup> Design theory provides insight and alternate approaches to

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58. Barnard, *Fashion as communication*., Roland Barthes, *The fashion system*, 1st ed. ed. (New York: Hill and Wang, 1983)., Joanne Entwistle, *The fashioned body: fashion, dress and modern social theory*, 2nd. ed. (Cambridge, UK Malden, MA: Polity, 2015)., Joanne Finkelstein, *The fashioned self / Joanne Finkelstein* (Oxford, UK: Polity Press, 1991)., J. C. Flugel, *The psychology of clothes* (London: Hogarth Press, 1971)., Georg Simmel, "Fashion," *American Journal of Sociology* 62, no. 6 (1957), <https://doi.org/10.1086/222102>, Thorstein Veblen, *Theory of the Leisure Class* (Start Publishing LLC, 2013)., Elizabeth Wilson, *Adorned in dreams: fashion and modernity* (New Brunswick, N.J. London: Rutgers University Press, 2003).
59. Kawamura, *Fashion-ology: an introduction to fashion studies*., Ingrid Loschek, *When Clothes Become Fashion: Design and Innovation Systems* (Oxford: Berg Publishers, 2009). <http://www.RMIT.eblib.com.au/patron/FullRecord.aspx?p=554580>.
60. Herbert Blumer, "Fashion: From Class Differentiation to Collective Selection," *The Sociological Quarterly* 10, no. 3 (1969), <https://doi.org/10.2307/4104916>, Pierre Bourdieu, *Distinction: a social critique of the judgement of taste* (London: Routledge, 2010)., Entwistle, *The fashioned body: fashion, dress and modern social theory*., Susan B. Kaiser, *The social psychology of clothing: symbolic appearances in context*, 2nd rev. ed. (New York: Fairchild, 1997).
61. Black, *Eco-Chic: The Fashion Paradox*., Fletcher, *Sustainable fashion and textiles: design journeys*., Gwilt and Rissanen, *Shaping Sustainable Fashion: changing the way we make and use clothes*.
62. See for example, Ellen MacArthur Foundation, *A New Textiles Economy: Redesigning Fashion's Future* (2017), [https://www.ellenmacarthurfoundation.org/assets/downloads/publications/A-New-Textiles-Economy\\_Full-Report\\_Updated\\_1-12-17.pdf](https://www.ellenmacarthurfoundation.org/assets/downloads/publications/A-New-Textiles-Economy_Full-Report_Updated_1-12-17.pdf).
63. Kirsi Laitala and Ingun Grimstad Klepp, "Age and active life of clothing" (PLATE, Nottingham Trent University, 17-19 June 2015)., Alice Payne, "The life-cycle of the fashion garment and the role of Australian mass market designers," *The International Journal of Environmental, Cultural, Economic and Social Sustainability* 7, no. 3 (2011), Elizabeth Shove, Mika Pantzar, and Matt Watson, *The Dynamics of Social Practice: Everyday Life and how it Changes* (London, GB: SAGE Publications Ltd, 2012)., Yolande Strengers and Cecily Maller, eds., *Social practices, intervention and sustainability: beyond behaviour change*, Routledge studies in sustainability (Abingdon, Oxon: Routledge, 2015)., WRAP, *Valuing Our Clothes: the true cost of how we design, use and dispose of clothing in the UK*, Waste & Resources Action Programme (2012), <http://www.wrap.org.uk/sites/files/wrap/VoC%20FINAL%20online%202012%2007%2011.pdf>.
64. The Australian Small Business and Family Enterprise Ombudsman, *Small Business Counts* (2016), [https://www.asbfeo.gov.au/sites/default/files/Small\\_Business\\_Statistical\\_Report-Final.pdf](https://www.asbfeo.gov.au/sites/default/files/Small_Business_Statistical_Report-Final.pdf).

developing more sustainable products and practices with a focus that is not centred on solutions for a specific industry. The work of researchers including Fry,<sup>65</sup> Jelsma,<sup>66</sup> McKenzie-Mohr<sup>67</sup> and Tonkinwise<sup>68</sup> build a conceptual framework for ways of rethinking sustainable design as a practice that is centred in ethics and relies on the power of objects to in turn empower more sustainable, and perhaps more ethical behaviours. These theories are not yet commonly applied to fashion contexts but will be shown to have potential for engaging with smaller scale solutions or even working at the level of the individual.

The chapter will conclude with a discussion of the gaps in existing knowledge surrounding fashion design for sustainability in order to examine this thesis's core research question: What if a fashion garment could enable its own longevity through design? I contend that the role of the wearer of fashion and the use phase of the garment life cycle are seriously under researched and provide an opportunity for the site of this research. The outcome of the literature and practice review demonstrates the need for a move from fixating on producing more sustainable products by improving supply chains or business practices to enabling more ethical and sustainable fashion practices. This will involve focusing instead on producing less product and developing new ways of looking at future fashion products other than as potential problems for the fashion sector. I will now discuss definitions of the concepts of fashion and sustainability, to locate the garment artefact as central to practices of enduring sustainability in fashion.

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65. Fry, *Design futuring: sustainability, ethics, and new practice*.

66. Jaap Jelsma, "Designing 'moralized' products," in *User Behavior and Technology Development*, ed. Peter-Paul Verbeek and Adriaan Slob (Springer Netherlands, 2006).

67. Doug McKenzie-Mohr, *Fostering sustainable behavior ; an introduction to community-based social marketing*, 3rd ed. ed. (Gabriola Island, BC: New Society Publishers, 2011).

68. Cameron Tonkinwise, "Ethics by Design, or the Ethos of Things," *Design Philosophy Papers* 2, no. 2 (2004/06/01 2004), <https://doi.org/10.2752/144871304X13966215067994>



## 2.1 DEFINING FASHION

"...fashion is that most personal of things, our second skin, and it is the thing that binds us to our society, how we make sense of who we are and who everyone else is too."

- Tim Edwards<sup>69</sup>

"Fashion as a belief is manifest through clothing."

- Yuniya Kawamura<sup>70</sup>

Theorists from a wide range of disciplines have contributed to the discourse on fashion, yet a succinct definition of fashion remains elusive.<sup>71</sup> At a basic level, the concept of fashion describes the way in which both material and immaterial things can be popular at one moment then passé the next.<sup>72</sup> Although typically synonymous with fashionable dress, fashion extends to a wide range of commodities like mobile phones, food, furniture,<sup>73</sup> and baby names,<sup>74</sup> and as Sproles has pointed out, ideas within the intellectual pursuits of science, literature, arts, and education are also subject to fashion.<sup>75</sup> Yet the phenomenon of fashion is most evident in the changes of clothing-fashion<sup>76</sup> over time.

For the purposes of this thesis, fashion will be referred to in relation to Kawamura's description of clothing-fashion. Kawamura begins the introduction to *Fashion-ology* by drawing a clear distinction between fashion and clothing. With reference to Brenninkmeyer<sup>77</sup>, she explains that while clothing and dress are the raw materials of fashion, not all clothing is fashion.<sup>78</sup> In contrast, clothing has a primarily material function- covering the body for modesty or protection, in ways dictated by the cultural norms of a society.<sup>79</sup> Importantly, clothing styles change slowly, as with for example, uniforms or protective wear.<sup>80</sup>

Kawamura suggests that for clothing to be "in-fashion", it must be transformed through a collective social process which sees it widely adopted within a society.<sup>81</sup> Clothing-fashion plays a critical role in identity formation precisely because it is worn on the body. Sociologist Joanne Entwistle describes clothes as the border between the body and its environment.<sup>82</sup> Beyond its affordances of physical

69. Tim Edwards, *Fashion in focus: concepts, practices and politics* (Milton Park, Abingdon, Oxon, New York: Routledge, 2011), p.2

70. Kawamura, *Fashion-ology: an introduction to fashion studies.*, p.1

71. Barnard, *Fashion as communication.*, Edwards, *Fashion in focus: concepts, practices and politics.*

72. Edwards, *Fashion in focus: concepts, practices and politics.*, p.2, Kawamura, *Fashion-ology: an introduction to fashion studies.*, p.51

73. Edwards, *Fashion in focus: concepts, practices and politics.*, George B. Sproles, "Analyzing Fashion Life Cycles: Principles and Perspectives," *Journal of Marketing* 45, no. 4 (1981), <https://doi.org/10.2307/1251479>

74. I. G. Klepp and K; Laitala, "Consumption Studies: The force of the ordinary " in *Routledge Handbook of Sustainability and Fashion*, ed. Mathilda Tham and Kate Fletcher (Abingdon, Oxon: Routledge, 2015).

75. Edwards, *Fashion in focus: concepts, practices and politics.*, p.2, Kawamura, *Fashion-ology: an introduction to fashion studies.*, p.2, Sproles, "Analyzing Fashion Life Cycles: Principles and Perspectives.", p.116

76. Kawamura, *Fashion-ology: an introduction to fashion studies.*, p.2

77. Ingrid Brenninkmeyer, *The Sociology of Fashion* (Koln-Opladen: Westdeutscher Verlag, 1963).

78. When I refer to fashion in this thesis, I am referring to fashion textile garments (as opposed to medical textile garments for example).

79. Barnard, *Fashion as communication.*, p.49

80. Barnard, *Fashion as communication.*, p.10

81. Kawamura, *Fashion-ology: an introduction to fashion studies.*, p.1

82. Entwistle, *The fashioned body: fashion, dress and modern social theory.*

protection from the elements, and conformity to social norms, clothing-fashion is an extension of the self. For Edwards,

*...the intimacy of the relationship with clothing and accessories to their wearers is particularly intense. At the crux of this is the interplay of the subject and object which is both bodily and symbolic. To put it simply, one's relationship with one's toaster, television or settee is not the same as one's relationship with shirts, shorts or shoes. Apart from a fundamental sensory element it is the role of clothing and accessories as an extension of the self which is often critical here.*<sup>83</sup>

With reference to Simmel,<sup>84</sup> Barnard states that fashion occurs where there is the need to belong to the group but also the desire to stand out. He quotes Wilson, "we want to look like our friend but not be clones."<sup>85</sup> While dressing for social inclusion exists in all societies (variously described by theorists as 'primitive, Western, modern and/or complex'),<sup>86</sup> theorists concur that it is the desire for differentiation that gives rise to fashion.<sup>87</sup> Kawamura contends that fashion "is not only about change, but an institutionalised, systemic change produced by those who are authorised to implement it."<sup>88</sup> Fashion requires a system of diffusion that comprises both the production of clothing and the production of the belief in fashion. In other words, the material and wearing of fashion is not able to achieve fashion status without some external validation by suitably empowered peers.

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83. Edwards, *Fashion in focus: concepts, practices and politics.*, p.123

84. Simmel, "Fashion."

85. Wilson in Barnard, *Fashion as communication.*, p.13

86. Barnard, *Fashion as communication.*, p.13

87. Barnard, *Fashion as communication.* with reference to Wilson, Simmel, p.12

88. Kawamura, *Fashion-ology: an introduction to fashion studies.*, p.49

## 2.2 WEARING FASHION

Practically, fashion is the outcome of habits of daily dressing. Ethnographer Sophie Woodward discusses how 'fashionability' is achieved through assemblage: the combination of new fashion garments with the existing wardrobe to create an outfit that is in keeping with the current fashions.<sup>89</sup>

*"People participate in fashion cultures as embedded individuals, and how people make choices regarding what to wear and buy relates to the organisation of relationships and the social and material contexts of the domestic as much as to the retail environment."*<sup>90</sup>

This implies that fashion is both individual and social, with each person constructing their own fashionable self, creating a unique interpretation of the prevailing tastes of their group. As Barnard says, "Mass produced garments are used to construct what is thought of and experienced as individual identity, a way of being different to everyone else."<sup>91</sup> The materiality of clothing-fashion affords this.

Woodward's argument of fashion as assemblage counters the homogeneity of High Street fast fashion.<sup>92</sup> Assembling an outfit is synonymous with styling a look, where style is both,

*"the 'what' and the 'way' of fashion – its design and how it is worn. This is at once collective, for what we understand as stylish is clearly culturally learned, and individual, as some people are simply perceived as having more style than others."*<sup>93</sup>

Styling involves the selection of individual garments as an ensemble, in combination with accessories (shoes, jewellery, hats, belts and so on) as well as bodily decoration: typically, hair styles and make up, but also tattooing and body modification. Importantly, the way we wear clothing is a key aspect of styling, for example, a shirt may be worn with sleeves rolled up or down, tail tucked in or out, buttons closed or open and collar standing or flat.<sup>94</sup> In this way, the same garment can be worn differently by different people to create different identities for people within the group.

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### 2.2.1 FASHION AS SOCIAL PRACTICE

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Clothing-fashion operates as the materials of the practice of fashion. Woodward's position of fashion as assemblage draws on social practice theory, where "fashion is not understood as separate or isolated phenomenon, but is embedded in wider cultural practices."<sup>95</sup> Reckwitz defines a practice as, "A routinised type of behaviour which consists of several elements, interconnected to one other: forms of bodily activities, forms of mental activities, 'things' and their use, a background knowledge in the form

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89. Woodward, "Accidentally Sustainable? Ethnographic approaches to clothing practices.", p.132

90. Woodward, "Accidentally Sustainable? Ethnographic approaches to clothing practices.", p.136

91. Barnard, *Fashion as communication*., p.12

92. Fletcher, *Sustainable fashion and textiles: design journeys*., p.186-187

93. Edwards, *Fashion in focus: concepts, practices and politics*., p.4

94. Other domestic commodities do not offer such affordances: to change the knobs on a toaster for example.

95. Woodward, "Accidentally Sustainable? Ethnographic approaches to clothing practices.", p.136

of understanding, know-how, states of emotion and motivational knowledge.”<sup>96</sup> Alternatively, according to sociologists Shove and colleagues, a practice is the integration of elements of three categories: materials, competences and meanings, performed by their carriers.<sup>97</sup> “Meanings refer to symbolic meanings, ideas and aspirations; competencies to ‘skill, know-how and technique’; and materials to things, technologies, tangible physical entities, and the stuff of which objects are made.”<sup>98</sup> When considered within the context of this research, Shove’s explanation of practice can be seen as equating clothing-fashion as material, meaning being centred in the social context, and competencies as the ability of an individual to identify and assemble fashion looks. Clothing-fashion is performed through wearing.

### 2.2.1.1 FASHION DISSEMINATION AND DIFFUSION

Beyond the way it is worn, various theories have been developed to explain how clothing-fashion changes are formed and disseminated. They fall into two broad categories, those that are industry led and those that are consumer led. The trickle-down theory<sup>99</sup> explains fashion trends arising from the aspirations of the working classes to emulate the aristocracy. The aristocracy exhibited their wealth through dress, which Veblen coined as “conspicuous consumption.”<sup>100</sup> The lower classes then copied these styles with the inferior materials available to them. Following industrialisation and mass-production in the twentieth century, High St. fashion brands would copy the designs of haute couture designers, adapting them to the cheaper, mass market.

Alternatively, mass-market theory<sup>101</sup> describes the impact of mass-production and mass-communication of the late nineteenth and twentieth centuries to make new styles available to all socio-economic groups simultaneously. Affordable copies of the latest fashion could be bought ‘off-the-peg’ in the new department stores or produced at home from a paper pattern. The fashion press, by deciding what is and is not published, has been particularly influential in setting trends. In the twenty-first century, this influence has been challenged and diluted by internet-based media, but remains present in figures like Anna Wintour, editor of U.S *Vogue* magazine.

Consumer-led theories explain how trends can spread from outside the fashion industry. The theory of collective selection<sup>102</sup> describes how “nearly any creative or innovative individuals can become leaders of fashion trends, provided innovative choices are reasonably in line with the social climate and lifestyles of the times.”<sup>103</sup> Today this is most evident in social media that gives agency to individuals to set trends through self-publishing on blogs and image sharing platforms like Instagram. Typically,

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96. Andreas Reckwitz, "Toward a Theory of Social Practices: A Development in Culturalist Theorizing," *European Journal of Social Theory* 5, no. 2 (May 1, 2002 2002), <https://doi.org/10.1177/1368431022225432>, p.249

97. Shove, Pantzar, and Watson, *The Dynamics of Social Practice: Everyday Life and how it Changes.*, p.12

98. Shove, Pantzar, and Watson, *The Dynamics of Social Practice: Everyday Life and how it Changes.*, p.14

99. Simmel, "Fashion" *International Quarterly*

100. Veblen, *Theory of the Leisure Class.*

101. Charles King, "Fashion adoption, a rebuttal to the 'trickle down' theory," in *Toward Scientific Marketing*, ed. Stephen A. Greyser (1963).

102. Blumer, "Fashion: From Class Differentiation to Collective Selection."

103. Sproles, "Analyzing Fashion Life Cycles: Principles and Perspectives.", p.120

these Insta-famous taste makers have no formal fashion industry training.<sup>104</sup> Instead they give their opinions on the fashions available, and through sharing the styling of their own individual looks, influence their followers' interpretations of fashion.<sup>105</sup>

The way that new fashion trends bubble up from subcultures to trickle down again through society from the upper classes is described by subcultural leadership theory.<sup>106</sup> This is particularly evident in the collections of haute couture designers in the 1990s and 2000s. Alexander McQueen, John Galliano, Rei Kawakubo, and Rick Owens are but a few of the designers who have been influenced by subcultural style. Internet technologies have also transformed how ideas within subcultures are spread, enabling disparate groups around the world to share ideas of fashion despite their geographic isolation. This has allowed for a flourishing of alternatives to the mainstream taste. For Woodward:

*The infatuation fashion has with constantly changing styles is now matched by the increased capacity to produce and retail fashions at a more rapid pace. This does not, however, determine the rate at which people replace their clothing. And so, we cannot "read off" the rate of fashion's change merely by looking at new developments in distribution, retail, and production.*<sup>107</sup>

The seasonal production of new trend-based collections gives the impression that consumers continuously replace their wardrobe at the same rate when in reality it is rare that for a new seasonal trend to be adopted completely and an entire wardrobe replaced. Despite this, the production of new clothing-fashion continues to exceed demand and accelerate in line with its growth based economic model. But what factors entice consumers to buy clothing-fashion that they do not need? An obvious explanation is that the fashion system is now a complex global network of material and immaterial production. Through the communication of fashion commodities (not limited to clothing-fashion), the symbolic fashion value of products has become separated from the physical product. Particularly, fashion continues to be a way of displaying wealth. For example, a Burberry™ trench coat with its iconic plaid lining is purchased as a status symbol, rather than for warmth,<sup>108</sup> and the distinctive red-soled Louboutin stiletto-heeled shoes gain popularity despite high-heeled shoes being impractical and uncomfortable to wear.<sup>109</sup> Consumers are encouraged to meet their fashion needs through the constant acquisition of new clothing, fostering increasingly disposable consumption habits since no real subject-object relationships form between wearer and garment. Max-Neef and colleagues have

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104. Two of the earliest social media influencers: Susie Bubble, Bryan Boy

105. It can be argued that the influence of social media is gradually being co-opted by the industry: product placement is now commonplace in social media content and social media platforms use algorithms to curate what users see.

106. Sproles, "Analyzing Fashion Life Cycles: Principles and Perspectives."

107. Sophie Woodward, "The Myth of Street Style," *Fashion Theory* 13, no. 1 (2009/03/01 2009), <https://doi.org/10.2752/175174109X381355>, p.100

108. Laura Barton and Nils Pratley, "The two faces of Burberry," *The Guardian*, 15 April 2004, Fashion, <https://www.theguardian.com/lifeandstyle/2004/apr/15/fashion.shopping>.

Allysha Nila, "The Iconic Appeal of a Burberry Trench Coat," *L'Officiel*, 19 June, 2017, <https://www.lofficielsingapore.com/fashion/burberry-womens-clothing-the-history-behind-the-brand-iconic-trench-coat>.

109. Emma Fierber, "Why Louboutin Shoes Are So Expensive," *Business Insider* (Australia), 4 October 2018, Executive Life, <https://www.businessinsider.com.au/why-christian-louboutin-shoes-are-so-expensive-red-bottoms-heels-2018-9?r=US&IR=T>.

Raquel Laneri, "Christian Louboutin, YSL And What's So Special About Red-Soled Shoes," *Forbes* 2011, <https://www.forbes.com/sites/raquellaneri/2011/08/17/christian-louboutin-ysl-and-whats-so-special-about-red-soled-shoes/#23a530ac3fe6>.

developed a matrix of needs that make up everyday life<sup>110</sup> that is widely used to explain how fashion is able to simultaneously satisfy physical, social, and ego needs (Table 2.1).

*"Everyday life is shaped according to how the needs in the left column are satisfied by the activities in the right column. Some satisfiers will simultaneously satisfy multiple needs." - Kossoff*

Needs (universal)	Examples of satisfiers (unique to time/place culture)
Subsistence	Food, shelter, clothing
Participation	Associations, churches, councils
Protection	Healthcare, shelter, social security
Affection	Friendship, family
Creation	Workshops, cultural groups, craft, music
Understanding	Literature, education, meditation
Identity	Customs, tradition, (fashion)
Freedom	Political organisations, councils
Idleness	Games, parties, sun bathing
Transcendence	Meditation, religion, spiritual practices

TABLE 2.1 A SIMPLIFIED RENDITION OF MAX-NEEF ET. AL'S MATRIX OF NEEDS (AFTER KOSSOFF)

### 2.2.1.2 REDIRECTING FASHION BEHAVIOURS TOWARDS SUSTAINABILITY

Now synonymous with the excessive production and consumption of fashion garments, the industrialised global supply chain of fashion is the tangible cause of the environmental and social harm that fashion causes. While this harm can be mitigated in part through an overall reduction in the production and consumption of fashion garments, effecting that change is not as simple as insisting people buy fewer clothes. For Tamsin Lejeune, CEO of Common Objective, (formerly The Ethical Fashion Forum), "The single most effective thing we could do tomorrow to reduce the impact of the fashion industry on the environment would be to buy a lot less."<sup>111</sup> Reducing over-consumption through strategies like "Buy Nothing Day"<sup>112</sup> seeks to change consumption habits by changing

110. Gideon Kossoff, "Holism and the reconstitution of everyday life: a framework for transition to a sustainable society," *Design Philosophy Papers* 13, no. 1 (2015/01/02 2015), <https://doi.org/10.1080/14487136.2015.1085698>

111. Tamsin Lejeune, "Fast Fashion: Can It Be Sustainable?," Common Objective, April 17, 2018, accessed September 20, 2018, <https://www.commonobjective.co/article/fast-fashion-can-it-be-sustainable>.

112. "Buy Nothing Day," 2017, accessed 10 December, 2018, <http://abillionpeople.org/buy-nothing-day/>.

attitudes to the purchase of new goods. The discourse on the over-consumption of fashion pin-points acquisition as problematic. Sustainable behaviour change programs often focus on consumption as the behaviour to be changed: to buy differently (Fair Trade) or consume less (reduce petrol by catching public transport to work). However, Warde<sup>113</sup> makes the point that consumption is a moment in practice, not a practice in itself: consumption facilitates an aim, (drinking coffee, getting to work). Thus, consumption is not generally consciously undertaken. Warde argues that affecting changes to consumption requires attention be given to the practices of which consumption is a moment. Focusing on the behaviour alone will only have limited effect. However social practice theories decentre the individual from the practice, focusing instead on activity, e.g. driving, not the driver.<sup>114</sup> Applied to clothing practices, this brings an emphasis to wearing, not the wearer. This would suggest that assuming a direct connection between practices of assemblage and wearing fashion, and fashion consumption may be flawed. Instead the acquisition of the garment is only the beginning of its consumption.

Alastair Fuad-Luke in *Design Activism* (2009) also talks about strategies for raising consumer awareness, changing perceptions and changing behaviour, stating that "sustainability is about living well but consuming (much) less"<sup>115</sup> He suggests:

*An intertwined strategy is required; the strategy to directly improve the eco-efficiencies of the product or service throughout its life cycle; and the strategy to deliver eco efficiencies indirectly by changing behaviours.*<sup>116</sup>

Design for sustainable behaviour change seeks to transform attitudes and behaviours of users to encourage habits of sustainable consumption. This has been approached in two ways: by raising public awareness of the issues as motivation for behaviour change, and by re-design of the products (or services) in question.<sup>117</sup> However in practice, environmentally positive attitudes do not always bring about environmentally positive behaviours. There is little evidence that campaigns to inform consumers of the consequences of their actions, results in them changing their attitudes (A) or behaviours (B) and therefore their lifestyle choices (C).<sup>118</sup> Shove is especially critical of the ABC model of social change, denouncing it as having a "strikingly limited understanding of the social world and how it changes."<sup>119</sup> Effecting behaviour change requires consideration of the social context in which the targeted behaviour is undertaken. The 'values-action gap' describes the disconnect between attitude and behaviour which results from significant barriers to participation, typically effort, convenience, and expense. Household waste recycling provides an example: participation in domestic recycling was low when householders needed to transport their own waste to recycling depots. The

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113. Alan Warde, "Consumption and Theories of Practice," *Journal of Consumer Culture* 5, no. 2 (July 1, 2005 2005), <https://doi.org/10.1177/1469540505053090>

114. Warde, "Consumption and Theories of Practice."

115. Alastair Fuad-Luke, *Design Activism Beautiful Strangeness for a Sustainable World* (London: Earthscan, 2009).

[http://www.RMIT.eblib.com.au/EBLWeb/patron?target=patron&extendedid=P\\_476576\\_0&](http://www.RMIT.eblib.com.au/EBLWeb/patron?target=patron&extendedid=P_476576_0&), p.86

116. Fuad-Luke, *Design Activism Beautiful Strangeness for a Sustainable World.*, p.89

117. for example, renewable energy and anti-sweatshop campaigns.

118. Elizabeth Shove, "Beyond the ABC: Climate Change Policy and Theories of Social Change," *Environment and Planning A* 42, no. 6 (June 1, 2010 2010), <https://doi.org/10.1068/a42282>, p.1275

119. Shove, "Beyond the ABC: Climate Change Policy and Theories of Social Change.", p.1273



introduction of regular kerbside collections replaced that effort with the convenience of discarding recyclables in the same manner as general waste, resulting in a dramatic increase in participation. There is now a wealth of research that illustrates the challenges of encouraging ethical consumption (of fashion and other goods), which identify cost, convenience and a lack of reliable information as significant barriers to consumer participation in ethical shopping.<sup>120</sup> Fundamentally, this research concurs that presenting the consumer with 'better' choices at point of purchase is not sufficient to ensure that ethical purchase decisions are made. If participation in domestic recycling can be increased by bringing a recycling service to households, then what methods exist that might be adapted to increase participation in the extended use of garments?

Over-production and over-consumption have resulted in a fashion and textiles industry that is unsustainable and causing harm. For the past decade, researchers have argued that better understanding of the use of clothing is needed for the fashion sector to transition to sustainability.<sup>121</sup> For example, acknowledging that even delicate garments can last a long time if cared for, Fletcher stresses that sustainable fashion is not only about the sustainable production of the garment but the ways in which it is used: worn, laundered, repaired and discarded. In an ethnographic study *Craft of Use*, Fletcher relates stories not unlike my experience of *The Bird Dress*. Garments are cited as examples of clothing use practices that perpetuate long lasting and rewarding relationships between wearers and their garments (for example, sharing, mending).<sup>122</sup> Fletcher makes apparent that sustainable clothing practices already exist and argues these practices might be amplified by design. Designing for evolving user relationships has the potential to reduce consumption if clothing is kept in use and not replaced.<sup>123</sup> Fletcher provides little explicit direction for designers on how to design for

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120. Clive Barnett, *Globalizing responsibility: the political rationalities of ethical consumption*, ed. Clive Barnett (Chichester, West Sussex, U.K.: Wiley-Blackwell, 2011); Robert E. Carter, "Will consumers pay a premium for ethical information?," *Social Responsibility Journal* 5, no. 4 (2009), <https://doi.org/doi:10.1108/17471110910995339>; Helen Goworek et al., "The sustainable clothing market: an evaluation of potential strategies for UK retailers," *International Journal of Retail & Distribution Management* 40, no. 12 (2012), <https://doi.org/doi:10.1108/09590551211274937>; Laitala, "Responsibility without means."; Louise Lundblad and Iain A. Davies, "The values and motivations behind sustainable fashion consumption," *Journal of Consumer Behaviour* 15, no. 2 (2016), <https://doi.org/10.1002/cb.1559>; McKenzie-Mohr, *Fostering sustainable behavior; an introduction to community-based social marketing*; Kirsi Niinimäki, "Ethical foundations in sustainable fashion," *Textiles and Clothing Sustainability* 1, no. 1 (2015); Anna Perry and Telin Chung, "Understand attitude-behavior gaps and benefit-behavior connections in Eco-Apparel," *Journal of Fashion Marketing and Management: An International Journal* 20, no. 1 (2016), <https://doi.org/doi:10.1108/JFMM-12-2014-0095>; Lucia A. Reisch and John Thøgersen, eds., *Handbook of research on sustainable consumption* (Edward Elgar Publishing Limited, 2015); Nicola Spurling et al., *Interventions in practice: re-framing policy approaches to consumer behaviour*, Sustainable Practices Research Group (United Kingdom, 2013), <http://www.sprg.ac.uk/uploads/executive-summary-sprg-report-sept-2013-.pdf>; Strengers and Maller, *Social practices, intervention and sustainability: beyond behaviour change*; Daniel Welch and Alan Warde, "Theories of practice and sustainable consumption," in *Handbook of research on sustainable consumption*, ed. Lucia A. Reisch and John Thøgersen (Edward Elgar Publishing Limited, 2015); Lucy Yates, "Sustainable consumption: the consumer perspective," *Consumer Policy Review* 18, no. 4 (2008)

121. Fletcher, *Sustainable fashion and textiles: design journeys.*

Alison Gwilt, "Integrating sustainable strategies in the fashion design process: A conceptual model of the fashion designer in haute couture" (Doctor of Philosophy (PhD) RMIT University, 2012).

122. Kate Fletcher, *Craft of Use: Post Growth Fashion* (Routledge, 2016).

123. Jonathan Chapman, "Subject/Object Relationships and Emotionally Durable Design," in *Longer Lasting Products: alternatives to the throwaway society*, ed. Tim Cooper (Farnham ; Burlington, VT: Gower Pub., 2010).

Anja-Lisa Hirscher, Kirsi Niinimäki, and Cosette M. Joyner Armstrong, "Social Manufacturing in the Fashion sector: New value creation through alternative design strategies?," *Journal of Cleaner Production* (2017/11/08/ 2017), <https://doi.org/https://doi.org/10.1016/j.jclepro.2017.11.020>,



emotionally durable subject-object relationships, but champions wearer participation in the design process as a means to engage both wearer and designer in the creation of satisfying experiences in fashion. Kate Fletcher is widely regarded as the leading researcher in the field in fashion design for sustainability. Over the past decade, Fletcher's research has made a significant and influential contribution to both the academic community and the fashion industry and she can be credited with driving the transition from considerations of fashion design for sustainability in production to fashion design for sustainability in use. Fletcher has consistently argued that sustainability is fundamentally incompatible with the prevalent fast fashion model and, like Clark<sup>124</sup> and Black,<sup>125</sup> argues for a rethink of what enables a rewarding fashion experience and how it might be achieved without excessive consumption.<sup>126</sup>

### 2.2.1.3 PARTICIPATION IN THE LOCAL WISDOM PROJECT

In 2013 RMIT University hosted Fletcher's Local Wisdom Project in Melbourne, for which I was the Project Manager. The Melbourne photoshoot concluded the research project which had previously visited the UK, USA, Canada, Denmark and New Zealand to conduct interviews with the public about how they wear clothes. Participants were asked to bring in a garment that met specific criteria of engaging use (Figure 2.1) to talk about and be photographed wearing. Participation in this project early in the period of candidature was influential on this research. Observing Fletcher conduct the interviews, being interviewed myself and seeing the variety of garments participants brought with them, made apparent to me that my research interest is focused on the specific capacity of a garment to enable or restrict extended use, whereas Fletcher was more interested in the practices performed. The stories collected through the Local Wisdom Project were gradually added to the website throughout the duration of the project (Figure 2.2) ahead of the publication of *The Craft of Use* and provided a valuable resource for reflection on use practices beyond my own experience of wearing fashion.

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Kirsi Niinimäki and Lotta Hassi, "Emerging design strategies in sustainable production and consumption of textiles and clothing," *Journal of Cleaner Production* 19, no. 16 (11// 2011), <https://doi.org/http://dx.doi.org/10.1016/j.jclepro.2011.04.020>,

Karen Fisher, Keith James, and Peter Maddox, *Benefits of re-use case study: clothing WRAP* (2011).

124. Clark, "SLOW + FASHION an Oxymoron or a Promise for the Future?."

125. Black, *Eco-Chic: The Fashion Paradox*.

126. Fletcher, *Sustainable fashion and textiles: design journeys*.

• PHOTOSHOOT •

WE ARE GATHERING STORIES ABOUT  
**HOW YOU USE**  
YOUR CLOTHES AND WANT TO TAKE  
YOUR PORTRAIT! JOIN US SATURDAY  
23 MARCH, 2013, 11:00AM - 4:00PM  
MELBOURNE GPO, 350 BOURKE ST, MELBOURNE VIC 3000

Perhaps your garment:

- Is easily repairable
- Shows or tells the story of how it's been used
- Connects you to others
- Is worn regularly and has never been washed (and isn't leather!)
- Is worn in ways that defy the producer's values
- Is worn in response to changing economic and environmental concerns
- Is enjoying a third, fourth or fifth life
- Is adapted over and again in order to meet changing needs
- Is made up of interchangeable pieces that can be worn in different ways
- Surprises you each time you wear it
- Is shared between people

What is involved: tell us how you use your garment and be photographed wearing it.

Age 18 and over only

CHANGING FACILITIES PROVIDED

For more information:  
www.localwisdom.info  
or contact us: more@localwisdom.info

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An international fashion research project exploring the 'craft of use'

Home About Gallery Use Practices Craft of Use Partners Blog Contact Login

Connections

The link between a person and a garment can never be planned for, but has lasting impact when a garment becomes a life-long companion. It reveals the potential for change in each individual and often marks that in the associations with a piece, for single, small actions can have big effects.

1990s Mapei

*'So this is sort of my favourite vintage cycling jacket, from the Italian cycling team Mapei, who are active during sort of from '93 to 2002... they were super successful during that period... it is my favourite vintage cycling jacket and kind of a little bit sentimental. I just like the pattern, the colour pattern, it's a bit unique.*

*Yes, [it is lined], I guess it is a kind of microfibre. But there is also like a stretch to it as well because they are meant to be worn relatively tight when you are*

Melbourne - March 2013  
Photograph by [Paul Allister](#)




FIGURE 2.1 ADVERTISEMENT FOR THE  
LOCAL WISDOM MELBOURNE  
PHOTOHSOOT

FIGURE 2.2 SCREENSHOT FROM THE LOCAL WISDOM PROJECT WEBSITE FEATURING A MELBOURNE  
PARTICIPANT

## 2.3 DEFINING SUSTAINABILITY

A considerable challenge to the transformation of fashion for sustainability is the lack of a clear definition. There are around 300 definitions of sustainability in circulation<sup>127</sup> and yet it is a concept frequently misunderstood and easily dismissed as vacuous 'green wash'.<sup>128</sup> In 2008, Thomas discussed that the lack of a common definition of sustainability and common language within the field of fashion was creating misunderstandings where "terminology (especially in the general and fashion media) is often misused." Thomas argued that greater progress might be made if consistent language, relevant to fashion be decided upon.<sup>129</sup> Ten years on, confusion persists within the sector and particularly amongst consumers who frequently struggle to act on sustainable intentions.<sup>130</sup> Markkula and Moisander consider "the knowledge-to-action gap as something that arises from the discursive struggle over proper meanings of sustainable development that is continuously going on in contemporary consumer society."<sup>131</sup> In other words, confusion surrounding terminology hampers sustainable action.

The consequences of this are evident in the findings of a recent consumer study. In 2017, Peirson-Smith and Evans<sup>132</sup> researched consumer knowledge of sustainable fashion by testing amongst consumers in Hong Kong, the 12 key 'green' words from Thomas' article: green, environmental, fair trade, eco, eco-fashion, sustainable, ethical, recycled, organic, upcycling, recycling, and downcycling.<sup>133</sup> They found confusion over definitions of terms and significant negative connotations with 'sustainability' particularly as it relates to fashion, which they link to the anti-fashion message of 1990s 'trash-couture'.<sup>134</sup> They identified a widely held belief amongst consumers that something needs to be done, and that responsibility to act lies with business and government, but that most consumers wanted more information about what they can do.<sup>135</sup>

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127. P. Johnston et al., "Reclaiming the Definition of Sustainability," *Environmental Science and Pollution Research - International* 14, no. 1 (2007/01/01 2007), <https://doi.org/10.1065/espr2007.01.375>

128. 'Green wash' describes marketing language used to sell products with 'eco' credentials. Joan Farrer, "Remediation: Discussing Fashion Textiles Sustainability," in *Shaping Sustainable Fashion: Changing the Way We Make and Use Clothes*, ed. Alison Gwilt and Timo Rissanen (London: Routledge, 2011), p.20

129. "Terminology provides definition, clarity, and boundaries which may be fought or celebrated." Sue Thomas, "From Green Blur to Eco-fashion: Fashioning an Eco-lexicon," *Fashion Theory: The Journal of Dress, Body & Culture* 12 (2008), <https://doi.org/10.2752/175174108x346977>

130. Laitala, "Responsibility without means.",

Anne Peirson-Smith and Susan Evans, "Fashioning Green Words and Eco Language: An Examination of the User Perception Gap for Fashion Brands Promoting Sustainable Practices," *Fashion Practice* (2017), <https://doi.org/10.1080/17569370.2017.1366688>

131. quoted in Peirson-Smith and Evans, "Fashioning Green Words and Eco Language: An Examination of the User Perception Gap for Fashion Brands Promoting Sustainable Practices.", p.4

132. 100 street interviews were followed by six focus groups with 30 young professionals. Peirson-Smith and Evans, "Fashioning Green Words and Eco Language: An Examination of the User Perception Gap for Fashion Brands Promoting Sustainable Practices."

133. Thomas, "From Green Blur to Eco-fashion: Fashioning an Eco-lexicon.", p.531

134. Trash-couture, or 'trashion' describes the incorporation of waste materials like plastic packaging into garments sometimes described as 'wearable art'. Bahar Emgin, "Trashion: The Return of the Disposed," Article, *Design Issues* 28, no. 1 (Winter2012 2012), [https://doi.org/10.1162/DESI\\_a\\_00124](https://doi.org/10.1162/DESI_a_00124)

135. Interestingly, recycling was found to carry positive connotations as something in which consumers can engage. That Fair Trade was found to be the most well understood and respected term, they attribute to its clear and consistent message and usage, which implies the benefit of

Aside from this, researchers such as Black, Fletcher, Farrer, and Geissdoerfer<sup>136</sup> concur that sustainability is most readily understood through interpretation of sustainable development, defined in the 1987 World Commission on Environment, Bruntland Report, *Our Common Future*, "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."<sup>137</sup> It is widely accepted that sustainable development seeks to balance profit with the needs of people and the planet through economic strategies of triple bottom line accounting,<sup>138</sup> and corporate social responsibility.<sup>139</sup> For example, industry organisation The Sustainable Apparel Coalition (providers of the Higg Index<sup>140</sup>) envision "an apparel, footwear, and textiles industry that produces no unnecessary environmental harm and has a positive impact on the people and communities associated with its activities."<sup>141</sup> However, by linking environmental sustainability to economic development, sustainable development has been criticised for bringing about a predominantly 'business as usual'<sup>142</sup> or band-aid<sup>143</sup> approach to sustainability which seeks to redress the situation from within the existing economic system, rather than a more radical implementation of wholesale systems change.

### 2.3.1 SUSTAIN-ABILITY

A more inclusive definition can be found in Tony Fry's *Design Futuring, sustainability, ethics and new practice* (2009), which is especially critical of The Bruntland Report's definition of sustainable development. He argued it neither provided a sound definition of 'sustainability' nor advocated for economic reform adequate to address the accelerating pace of humanity's defuturing.<sup>144</sup> That Fry drew out the anthropocentric viewpoint of the report has been significant in shifting the design approach

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accreditation labels to help consumers make 'good' choices.

136. Sandy Black, *The Sustainable Fashion Handbook* (London: Thames and Hudson, 2012).,

Fletcher, *Sustainable fashion and textiles: design journeys.*,

Fry, *Design futuring: sustainability, ethics, and new practice.*,

Farrer in Gwilt and Rissanen, *Shaping Sustainable Fashion: changing the way we make and use clothes.*,

Martin Geissdoerfer et al., "The Circular Economy – A new sustainability paradigm?," *Journal of Cleaner Production* 143 (2017/02/01/ 2017),

<https://doi.org/https://doi.org/10.1016/j.jclepro.2016.12.048>,

Hethorn and Ulasewicz, *Sustainable fashion - why now?: a conversation exploring issues, practices, and possibilities.*,

137. World Commission on Environment and Development, *Report of the World Commission on Environment and Development: Our Common Future*, United Nations World Commission on Environment and Development (WCED) (Oxford: Oxford University Press, 1987).

138. "Triple bottom line," *The Economist*, 17th November 2009, <https://www.economist.com/node/14301663>.

139. Mark S. Schwartz and Archie B. Carroll, "Corporate Social Responsibility: A Three-Domain Approach," *Business Ethics Quarterly* 13, no. 4 (2003), <https://doi.org/10.5840/beq200313435>

140. The Higg Index is a suite of tools that accurately measures a company or product's sustainability performance. Sustainable Apparel Coalition, "The Higg Index."

141. Sustainable Apparel Coalition, "Sustainable Apparel Coalition," accessed March 15, 2018, <https://apparelcoalition.org/the-sac/>.

142. Fletcher quoted in Thomas, "From Green Blur to Eco-fashion: Fashioning an Eco-lexicon.", p.535

143. Clive Dilnot, "Sustainability and Unsustainability in a World Become Artificial: Sustainability as a Project of History," *Design Philosophy Papers* 9, no. 2 (2011/07/01 2011), <https://doi.org/10.2752/144871311X13968752924671>, p.114; John R. Ehrenfeld, *Sustainability by Design - A Subversive Strategy for Transforming Our Consumer Culture* (New Haven, London: Yale University Press, 2008).

144. Fry, *Design futuring: sustainability, ethics, and new practice.*, pp.41-43

taken to sustainability in this thesis. Specifically, it resulted in the study focusing on the agentic capacity of the garment (rather than the designer), to enable sustainable fashion practices.

In its focus on securing the future of human generations, Fry argues that The Bruntland Report overlooks the interconnectedness of all biological life; that the future of the human population necessitates care for the natural world upon which we depend. Further, he argues there is a failure to address the current inequity between human populations, where “small percentages of the world’s population command a disproportionately large amount of its resources.” He argues that a base-line for quality of life should be set that can be met within planetary boundaries. For some populations, this would require significant material restraints.<sup>145</sup> Fry situates The Bruntland Report within the political landscape of the time of its publication, which he contends would not have been receptive to a challenge to capitalism.<sup>146</sup> Therefore, ‘sustainable development’ was little more than “an argument for a mild reform of the existing paradigm of economic development.”<sup>147</sup>

In addition, Fry contests the implication that sustainability is a realisable objective.<sup>148</sup> He instead interprets sustainability as an ongoing condition of ‘sustain-ability’, that he defines as “A means to secure and maintain a qualitative condition of being over time [...] a process (rather than an end point) where in all that supports and extends being exceeds everything that negates it.”<sup>149</sup> Sustain-ability is deliberately hyphenated to distance its meaning from that conventionally (mis-)understood, and to emphasise that sustain-ability is a state of being (not a project), to be continually enacted to ensure that human activity (including economic activity) sustains rather than diminishes the future. Sustain-ability “...is an acceptance of anthropocentric desire – it is about ‘saving humanity’ by saving what we collectively depend upon [...] and it implies changing the processes by which our lives are sustained.”<sup>150</sup> In the spirit of major turning points in history, like the Enlightenment, Fry proposes The Sustainment<sup>151</sup> and argues it can only be brought about by design, the definition of which he expands beyond its professions to emphasise its world-shaping force. The way Fry draws out the anthropocentric viewpoint, sustainability being human centric, has implications for shifting approaches taken to design for sustainability. Sustain-ability embeds with the design process, the responsibility for its futuring or defuturing consequences.

In this study, approaching design for sustainability as design for ‘sustain-ability’, provides a framework for the practice transformation. ‘Sustain-ability’ as defined by Fry, is used throughout this thesis for its acknowledgment of sustain-ability as a lived condition. I use ‘sustain-ability’ to describe the motivations, methods and outcomes of my own practice, while ‘sustainability’ is used when discussing conventional interpretations of sustainable theory and practice.

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145. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.42-43

146. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.41-43

147. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.43

148. Fry, *Design futuring: sustainability, ethics, and new practice.*, pp.41-43

149. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.43

150. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.44

151. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.45

## 2.4 DESIGNING SUSTAINABLE FASHION

This section discusses existing theories and practical strategies for sustainability from within fashion and textiles and the wider field of design research. Starting with an overview of the evolution of fashion design for sustainability as a specific field of scholarship within fashion studies, the section moves through a review of existing resources for designers seeking methods of designing fashion with sustainability, and a mapping of practice approaches within industry. A disciplinary tendency to focus on clothing life cycle analysis to inform fashion design for sustainability that overlooks the role fashion plays in determining garment use is discussed with reference to emerging research into clothing use practices.

### 2.4.1 FASHION DESIGN FOR SUSTAINABILITY AS A SCHOLARLY FIELD

A timeline of key contributions to the evolution of fashion design for sustainability was charted through literature review (Appendix 1). The resulting table shows that while early action to mitigate the harmful impacts of fashion production was initiated by brands and designers within the industry, from the mid 2000s, fashion design for sustainability began evolving rapidly as a field of academic enquiry. There were two major questions being addressed: *can* fashion be sustainable, and *how* can fashion be sustainable?

The development of research into fashion design for sustainability drew on early design for sustainability approaches that sought to improve existing products and processes: for example, green design and ecodesign. These approaches were informed by emerging thinking on the importance of life cycle analysis to sustainable design, popularised by McDonough, W. and M. Braungart as Cradle-to-Cradle design.<sup>152</sup> Cradle-to-Cradle life cycle thinking examines the material and energy flows associated with the entire life cycle of a product, from the manufacture of its materials, through production of the product, use by the consumer and then disposal. Cradle-to-Cradle design emphasises that there is no such thing as 'away' when users discard a product, that it persists in a degraded form in landfill if it is not re-used or recycled. There were two main consequences to design of this development: it highlighted the importance of the use phase to the overall sustainability of products and encouraged research into sustainable end-of-life scenarios for unwanted products, the latter of which became a focus for fashion design for sustainability. However, as Gardetti and Torres' diagram (Figure 1.4) indicates, sustainability understood as additional parameters of product design has resulted in the perception of sustainability as an obstacle with impacts across the textile industry and at the design stage of the clothing and fashion industry.<sup>153</sup> Regrettably, early efforts within the fashion design industry to improve sustainability within the supply chain are responsible for the persistent connotation that 'eco' and 'green' fashion necessitates a compromise on fashion-ability in

152. McDonough and Braungart, "Cradle to cradle: remaking the way we make things."

153. Gardetti and Torres, *Sustainability in Fashion and Textiles: Values, Design, Production and Consumption*, p.7



favour of sustainability. Black explains that these early collections were more concerned with values than aesthetics.<sup>154</sup> For example, with their Ecocollection, launched in 1992, Esprit<sup>155</sup> sought to mitigate the harmful social and environmental impacts of the garment supply chain by sourcing alternative fabrics, giving preference to natural fibres like hemp and linen, in natural and unbleached colourways. Esprit is credited with bringing the issues of the industry to a mainstream audience, but regrettably also for the lingering association of drab hemp to sustainable fashion.<sup>156</sup>

During the 2000s, a number of significant works on fashion design for sustainability were published. The following texts published in 2008 have been particularly influential on the field: *Eco-Chic: The Fashion Paradox*, by Sandy Black, *Sustainable Fashion, Why Now?* edited by Hethorn, J. and C. Ulasewicz, *Sustainable fashion and textiles: design journeys* by Kate Fletcher and the special issue of *Fashion Theory: The Journal of Dress, Body & Culture*, featuring the article, "SLOW + FASHION an Oxymoron or a Promise for the Future?" by Hazel Clark. Together these texts break down the issue of sustainability within a complex global fashion system of symbolic and material production into component parts for examination, speculation and redirection. They contextualise sustainable fashion within the timeline of fashion history, examine the problems of the sector through the various stages of the life cycle of fashion and textile products and discuss the emerging alternative practices that demonstrate the potential for transformation of the sector. Further, they counter the prevailing argument at the time that sustainable fashion is a contradiction<sup>157</sup> with theories, philosophies, and case studies of emerging practice that demonstrated otherwise.

Reviewing the publications in Appendix 1, it is apparent that many of them are formatted (if not titled) as handbooks, emphasising their aim to be resources for designers to transform practice, and a general emphasis within the discipline on practice, that is, practical approaches to the transition to sustainability. Within these handbooks the unsustainability of fashion is largely explored by segmenting the garment life cycle into stages of production, use, and disposal. This provides a logical structure within which to discuss the harmful environmental and social impacts of each stage within the linear system. At the same time, the potential for the designer to effect change within the established system is highlighted, while noting the challenges they face in doing so.<sup>158</sup> There is a concerted effort on the part of these authors not to propose a strict new regime for fashion design for sustainability, but rather provide the toolkit needed to address the imperative for change. Although primarily pitched at

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154. Black, *Eco-Chic: The Fashion Paradox*, p.21

155. Esprit's Ecocollection is an early example of an established organisation attempting to shift their practices towards sustainability. At the same time, new brands were emerging, founded on similar principles of sustainable production, but without the added challenge of an entrenched existing business model to change. For example Conscious Earthwear (founded 1992, later rebranded as Ciel).

156. Black, *Eco-Chic: The Fashion Paradox*.

157. Coulson quoted in Thomas, "From Green Blur to Eco-fashion: Fashioning an Eco-lexicon.", see also Clark, "SLOW + FASHION an Oxymoron or a Promise for the Future?."

Black, *Eco-Chic: The Fashion Paradox*; Hethorn and Ulasewicz, *Sustainable fashion - why now?: a conversation exploring issues, practices, and possibilities*; Stuart Walker, *Sustainable by design : explorations in theory and practice* (London ; Sterling, VA: Earthscan, 2006).

158. Fletcher and Grose, *Fashion & sustainability: design for change.*, Gwilt and Rissanen, *Shaping Sustainable Fashion: changing the way we make and use clothes.*

designers, they also accommodate industry stakeholders, governing agencies, students, and consumers, using accessible language and formats, to best ensure the uptake of the ideas within.

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## 2.4.2 FASHION DESIGN FOR SUSTAINABILITY STRATEGIES

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A process of mapping key design strategies revealed in the literature was subsequently undertaken to ascertain the availability of directions for designers by examining publicly available sources (websites, books) and scholarly articles retrieved from university library databases. The intention was to collate an overview of the scope and depth of resources available to designers seeking to transition their practice for sustainability. It comprises a compilation of lists of design for sustainability strategies retrieved from four sources considered to be representative of the information available during the period of the research study: two websites, a scholarly article and handbook. A condensed version of this mapping is included in Appendix 2.

The first website is the Ted 10, chosen because of its significant influence with the field since its inception. The Textile Environment Design (TED) research group at Chelsea College of the Arts is one of the earliest university/industry collaborative groups to be established (1996). Motivated by the claim 'Eighty percent of a product's environmental and economic costs (are) committed by the final design stage before production begins'<sup>159</sup> TED developed the TED 10 between 2006-2010<sup>160</sup>: a suite of ten design strategies presented as a pack of cards, to assist designers to navigate the complexity of the transforming their practice for sustainability.<sup>161</sup> Strategies include approaches to improve existing ways of designing products and also begin to address the need for system change. For example, 'Design to Minimise Waste', 'Design for Cyclability', 'Design that Explores Clean / Better Technologies', but also 'Design to Reduce the Need to Consume', 'Design to Dematerialise and Develop Systems & Services' and 'Design Activism'.<sup>162</sup> The subsequent design for sustainability strategies listed in Appendix 2 have been mapped as closely as possible to the Ted 10.

The second website listed is Circular Fashion, an industry resource created by an independent consultant, Dr. Anna Brismar of Green Strategy to, "support and promote a more circular and sustainable fashion, apparel and textile industry."<sup>163</sup> This list is included because it amongst the first retrieved in a web search of 'circular fashion' making it visible to a wide audience.<sup>164</sup> With sixteen principles, divided into two categories, it is the longest list reviewed. Principles one to thirteen are covered in detail on the website as they are considered to be principles upon which the designer can

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159. T. E. Graedel and Braden R. Allenby, *Industrial ecology*, ed. Braden R. Allenby, 1st edition ed. (Upper Saddle River, N.J.: Prentice Hall, 1995), p.17 quoted at Textiles Futures Research Centre, "Textiles Environment Design," University of the Arts London, 1996, accessed May 10, 2018, <https://www.arts.ac.uk/research/groups-networks-and-collaborations/textiles-environment-design>.

160. Becky Earley, "B. Earley," accessed May 10, 2018, <http://www.beckyearley.com/the-ten/>.

161. TED, "TED's ten sustainable design strategies," n.d., accessed September 9, 2015, <http://www.tedresearch.net/teds-ten/>.

162. At this time, the pack of cards format was especially popular. See also the very influential IDEO, "Method Cards," accessed May 10, 2018, <https://www.ideo.com/post/method-cards>. also Dan Lockton, "Design with Intent," accessed May 10, 2018, <http://designwithintent.co.uk/>.

163. Anna Brismar, "Green Strategy," 2012, accessed October 13, 2016, <http://www.greenstrategy.se/en/>.

164. Circular Fashion is defined in section 2.5 below.



act. The final three are consumer principles and are not discussed in detail on the website because the website “is primarily concerned with the producer perspective and those stages of a product’s life cycle on which producers may have direct influence.”<sup>165</sup> This is a curious distinction since the website seeks to support circular fashion which requires a relational understanding of the garment life cycle: that decisions made at the point of design impact how the garment is used. This point will be discussed in more detail in below.

Also included in the mapping are design strategies proposed by researchers at Norway’s National Institute for Consumer Research (SIFO), being the outcome of extensive research into clothing lifetimes and patterns of use and finally Black’s list of ‘Approaches to the Fashion Paradox’ published in *Eco-Chic: the fashion paradox* is included for its influence on thinking within the sector at the time this study commenced.<sup>166</sup> The resulting table reveals a general consensus on strategies of design for sustainability appropriate to fashion, yet the number and scope of approaches varies greatly, as does the language used.

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### 2.4.3 A MODEL OF FASHION DESIGN PRACTICE FOR SUSTAINABILITY

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The complexity created by these overlapping frameworks can confuse and disorient designers seeking practical guidance on how to change their established practice. In response to this, Gwilt mapped the role of the fashion designer as a prelude to discussing the opportunities within for positive interventions towards sustainability.<sup>167</sup> With reference to Sinha,<sup>168</sup> Gwilt asserts that while fashion design and production is undertaken at a range of market levels and scales of operation (from the multi-national and mass-market to local and bespoke), a conventional process does exist (Figure 2.3). Gwilt proceeds to elaborate on each stage of the process and how different organisational structures can present different problems to implementing sustainable design strategies.<sup>169</sup>

Gwilt offers a critique of current approaches to engaging with sustainability in the fashion sector by identifying three key problem areas:

1. That sustainable design strategies are largely understood as an afterthought of product development (eco-fabric) rather than a principle to inform the design process (for example, design for disassembly),
2. That sustainable design strategies are not integrated into existing design practice therefore denying the potential reflexive interplay between the two “parallel lines of thought”

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165. Anna Brismar, “Circular Fashion,” 2015, accessed October 13, 2016, <http://circularfashion.com/key-principles/>.

166. Black, *Eco-Chic: The Fashion Paradox*.

167. Alison Gwilt, “Producing Sustainable Fashion: The Points for Positive Intervention by the Fashion Designer,” in *Shaping Sustainable Fashion: Changing the Way We Make and Use Clothes*, ed. Alison Gwilt and Timo Rissanen (London: Routledge, 2011).

168. Pammi Sinha, “Creativity in Fashion,” *Journal of Textile and Apparel, Technology and Management* 2, no. IV (2002)

169. Gwilt and Rissanen, *Shaping Sustainable Fashion: changing the way we make and use clothes.*, p.64,

See also Grose in Gardetti and Torres, *Sustainability in Fashion and Textiles: Values, Design, Production and Consumption.*, p.56

3. That the fashion brief rarely includes a life cycle approach to design that accounts for use and disposal of the garment.<sup>170</sup>

Gwilt addresses the issue in her PhD thesis, by developing a new holistic framework for fashion design practice, including a fashion design for sustainability model which aligns sustainable design strategies within the conventional fashion design and production process (Figure 2.4).<sup>171</sup> This approach Gwilt advocates, makes it easier for designers to recognise and action the opportunities within the various phases of the garment life cycle.

Gwilt proposes this model to assist the designer to assess where negative impacts exist within the life cycle of the garment to be developed and what solutions might be available. For example, Gwilt connects the initial garment design stage to sustainability strategies 'design for disassembly' and 'design for a closed loop product system' and garment use to 'design for modularity and 'design for ease of maintenance and repair.' The resulting matrix is depicted as non-linear, demonstrating the way sustainability is embedded throughout the design and production process. It further shows how a range of design for sustainability approaches can be implemented together. Many of these strategies require consideration of the likely use of the garment and therefore the model successfully presents a holistic approach to design in consideration of the complete garment life cycle.

Gwilt's diagram reflects the relational thinking required of Fry's redirective practice, which requires an assessment of the practitioner's current practice and circumstances to identify what is unsustainable, and what redirective opportunities are available.<sup>172</sup> Part of this process is the acknowledgment of the practitioner's contribution to the current state of unsustainability, which Gwilt's diagram reflects with the positioning of the designer at the centre. From this position, the practitioner can see their responsibility to effect change and the many opportunities to do so.

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170. Gwilt and Rissanen, *Shaping Sustainable Fashion: changing the way we make and use clothes.*, pp.69-70

171. Gwilt, "Integrating sustainable strategies in the fashion design process: A conceptual model of the fashion designer in haute couture.", pp.90-91

172. Fry, *Design futuring: sustainability, ethics, and new practice.*, pp.224-225

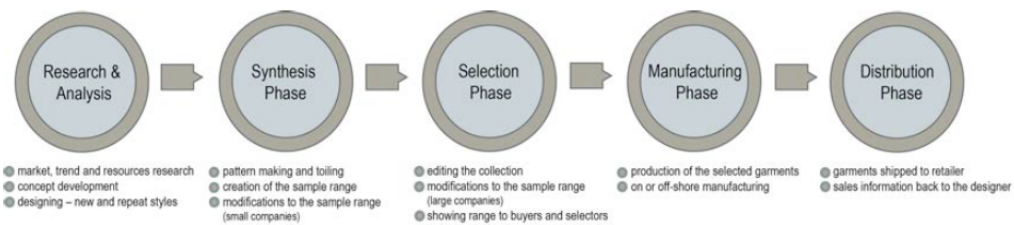


FIGURE 2.3. THE FIVE PHASES OF FASHION DESIGN AND PRODUCTION © A. GWILT (AFTER SINHA).

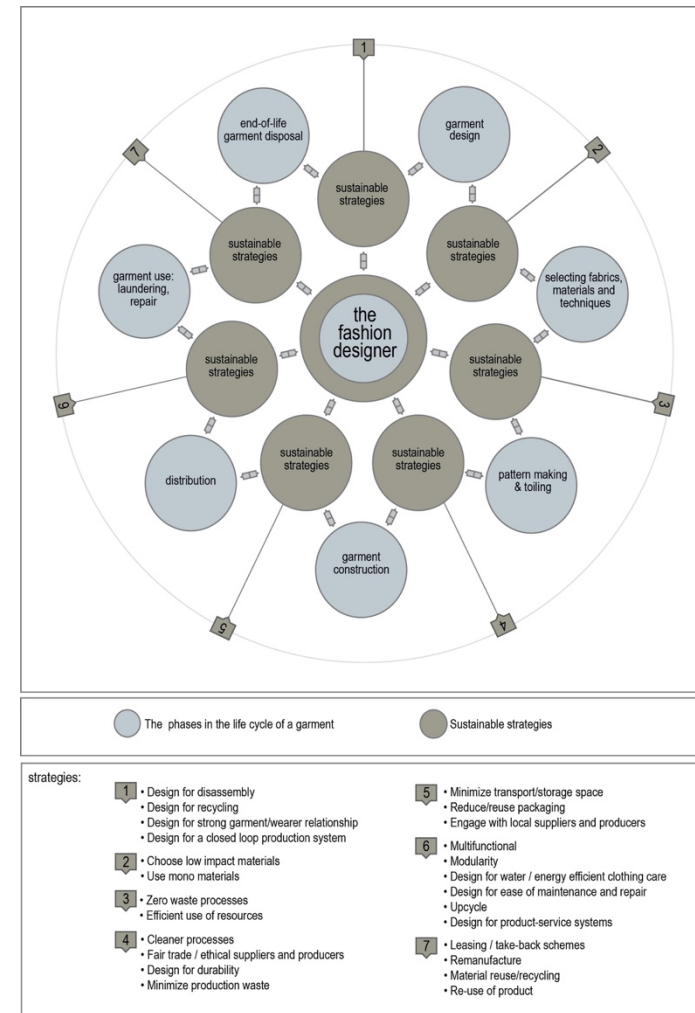


FIGURE 2.4. FASHION DESIGN FOR SUSTAINABILITY (FDS) MODEL DEVELOPED BY A. GWILT ©

## 2.4.4 CONTEMPORARY FASHION BUSINESS AND CONSUMER PRACTICES FOR SUSTAIN-ABILITY

To complement the review of existing literature, a mapping of current industry and consumer practices was undertaken (Figure 2.5). This provides a snapshot of existing commercial fashion practices with the potential to support greater sustain-ability in the garment life cycle. Case studies and examples discussed in the literature were extended upon through internet searches which located other similar businesses, and by searching key terms from the literature like 'eco-fabrics' and 'fashion customisation'. In addition, my professional knowledge of the industry, especially within Australia, provided further examples. The visual mapping was drawn using mind-mapping software Coggle, that facilitates the hierarchical grouping of data under headings. The method of mind mapping enabled examples to be grouped under keywords and re-arranged as subsequent examples were added, refining and focusing the groupings.

Retail point of sale, at which the ownership of the garment transfers from producer to consumer, emerged as the division point between two main groupings of fashion practices with potential to support sustain-ability: those that are producer-led and those that are consumer-led. Within the Producer half of the map, Production, Fabrics, Animal Welfare and Design generally describe businesses that have adapted their product development processes and materials to mitigate or eliminate harmful environmental or social consequences. The examples grouped under Business Models may do this also (for example, Patagonia) but some of the examples included do not. Businesses like Le Tote<sup>173</sup> that operate a Product Service System business model are included because existing literature in both design for sustainability and fashion design for sustainability has identified their business model as one with potential to be redirected for sustainability.<sup>174</sup>

On the Consumer side of the map, groupings reflect alternative approaches to the acquisition of fashion garments (made-to-order, buying second hand, swapping) to care and use of garments (repair, re-making) and to the discard of garments (donating to charity). A mix of community groups, not-for-profit as well as for-profit enterprises operate using these practices. The positioning of some of the examples within the consumer side of the map could perhaps be challenged. For example, buying second hand fashion relies on shops that sell second hand clothing. The conundrum this presented in creating the map led to the most significant finding of the mapping activity: there is considerable scope to combine various methods of sustainable product design with business models that enable consumer to acquire, wear and discard garments with greater sustain-ability. For example, sustainably produced products might be more sustainably used if they are rented rather than purchased and designed for disassembly and recycling at end of life. This finding complemented that of the literature review by

173. Le Tote Inc., "Le Tote," accessed 17 June, 2016, <https://www.letote.com/>.

174. Cosette M. Armstrong and Chunmin Lang, "Sustainable Product Service Systems: The New Frontier in Apparel Retailing?," *Research Journal of Textile and Apparel* 17, no. 1 (2013), Fabrizio Ceschin and Idil Gaziulusoy, "Evolution of design for sustainability: From product design to design for system innovations and transitions," *Design Studies* (2016), <https://doi.org/http://dx.doi.org/10.1016/j.destud.2016.09.002>

highlighting the division the point of sale occupies within the garment lifecycle and stressing the importance to the overall sustain-ability of the product of bridging that division, by design. Further, it hinted that while many good efforts are being made within the existing industry, their impacts have so far been limited.

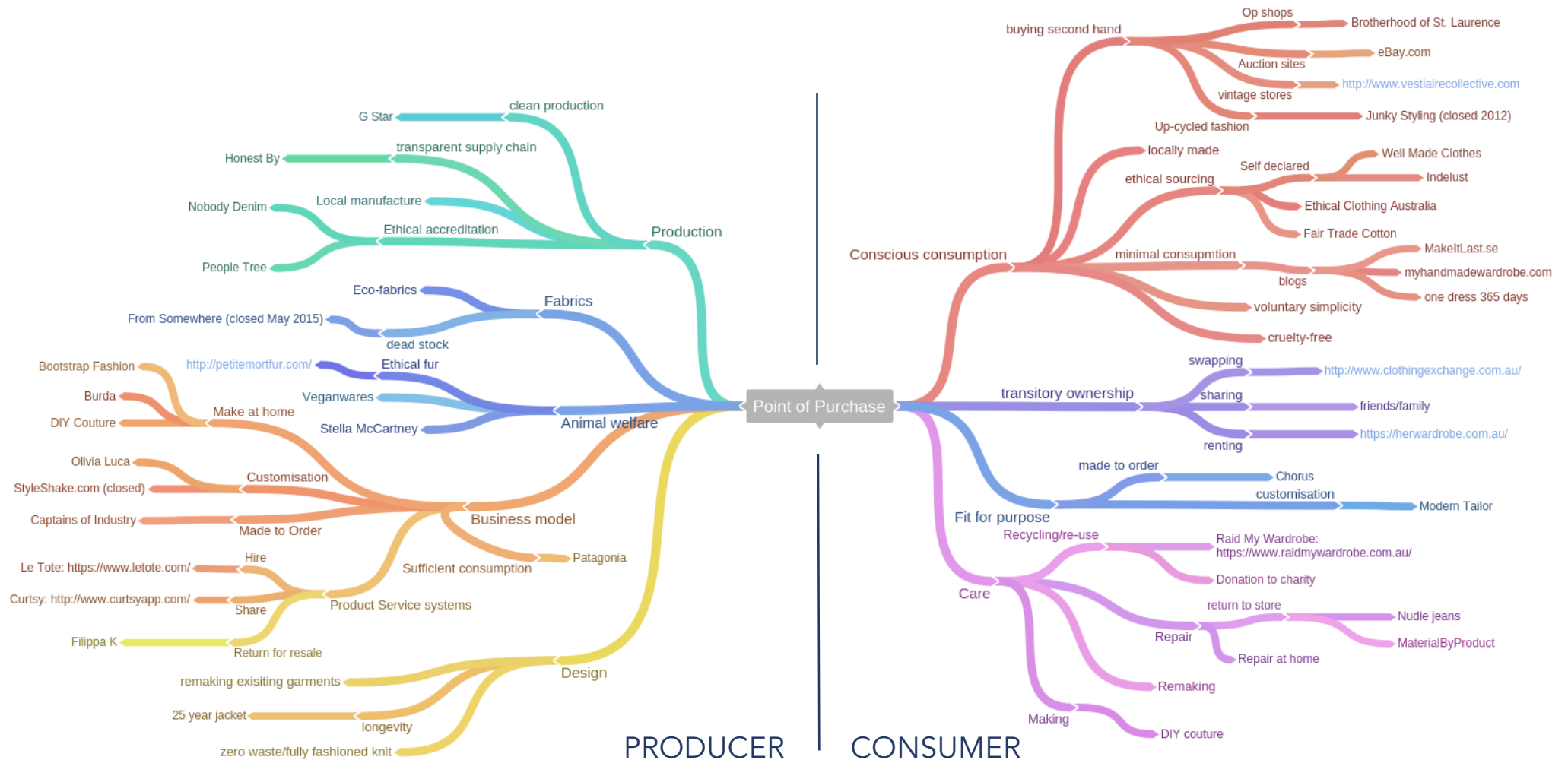


FIGURE 2.5 MAP OF EXAMPLES OF EXISTING COMMERCIAL FASHION PRACTICES WITH THE POTENTIAL FOR GREATER SUSTAIN-ABILITY IN THE GARMENT LIFE CYCLE.

## 2.5 CIRCULAR FASHION

*"many efforts are already being made by brands, retailers, and other organisations to change the industry. These efforts offer solutions and demonstrate promising progress in various areas but are fragmented and often only effective at small scale. Ensuring the critical characteristics for system-level change are in place would harness this momentum and accelerate the transition."*

- Ellen MacArthur Foundation<sup>175</sup>

So far, this chapter has detailed theories and practices that make up current approaches to implementing sustainability within the existing economic fashion system. However, as cited above, there is need for change at a systems level to mitigate the harmful impacts of the global scale of the fashion sector. 'Circular fashion', a model for the transformation of the global industry, is discussed below as the foremost solution gaining momentum within the sector.

Circular fashion is an extension of the concept of a circular economy, a business model based on life cycle thinking,<sup>176</sup> which seeks to account for all direct and indirect impacts of the material and energy flows associated with the entire life cycle of a product: from the manufacture of its materials, through production of the product, consumer use<sup>177</sup> and disposal. Transposed to an economic framework, the production and consumption of goods are repositioned from a linear trajectory of use and disposal to a continuous cycle of circulating resources (Figure 2.6). It is modelled on biological systems where nutrients are fed back into the growth cycle in a closed loop. Closed loop production reduces the consumption of virgin resources and environmental pollution. Therefore, establishing a circular economy is seen as key to the transition to a low-carbon future.<sup>178</sup>

The Ellen MacArthur Foundation has been instrumental in the formation of a coherent framework for a circular economy, bringing together businesses, policy makers, and academia, globally, to work on collaborative solutions.<sup>179</sup> The Foundation emphasises the opportunities of a circular economy within their definition:

*Looking beyond the current take-make-dispose extractive industrial model, a circular economy aims to redefine growth, focusing on positive society-wide benefits. It entails gradually decoupling economic activity from the consumption of finite resources and designing waste out of the system. Underpinned by a transition to renewable energy sources, the circular model builds economic, natural, and social capital. It is based on three principles: Design out waste and pollution, Keep products and materials in use, Regenerate natural systems<sup>180</sup>*

175. Ellen MacArthur Foundation, *A New Textiles Economy: Redesigning Fashion's Future.*, pp. 26

176. McDonough and Braungart, "Cradle to cradle: remaking the way we make things."

177. Julian M Allwood et al., *Well dressed? The present and future sustainability of clothing and textiles in the United Kingdom.*, University of Cambridge Institute for Manufacturing. (Cambridge: University of Cambridge Institute for Manufacturing., 2006).

178. Ellen MacArthur Foundation, *Towards the Circular Economy* (2013).

179. Geissdoerfer et al., "The Circular Economy – A new sustainability paradigm?," p.759

180. Ellen MacArthur Foundation, "Concept," 2017, accessed October 1, 2018, <https://www.ellenmacarthurfoundation.org/circular-economy/concept>

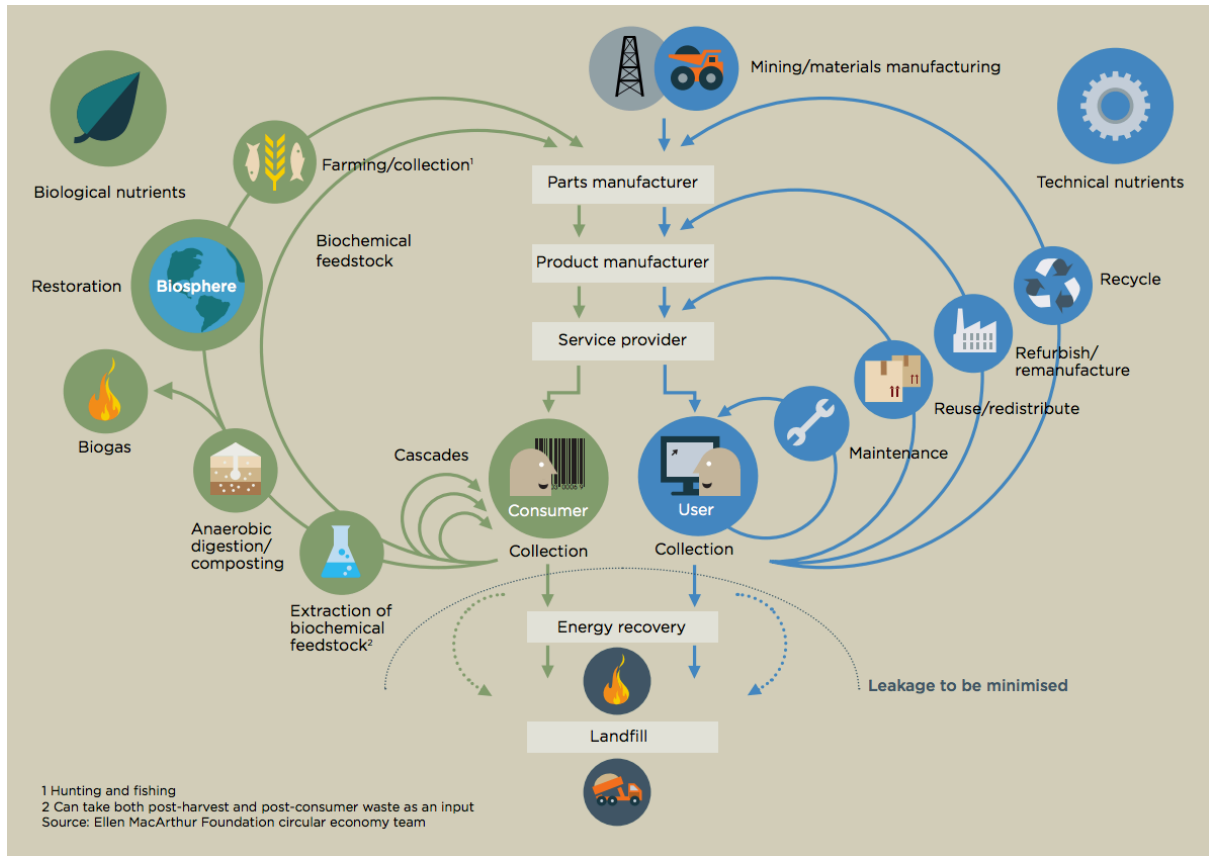


FIGURE 2.6. CIRCULAR ECONOMY SYSTEM DIAGRAM © ELLEN MACARTHUR FOUNDATION.

The Foundation focuses specifically on the fashion industry with their Make Fashion Circular initiative, that seeks to radically re-design the fashion industry's operating model to "ensure clothes are made from safe and renewable materials, new business models increase their use, and old clothes are turned into new."<sup>181</sup> In their 2017 report, *A New Textiles Economy*, they identify four key ambitions with suggested strategies for implementation as tabled below (Table 2.2). In the fashion sector, the emphasis presently is in the collection and remanufacture of fashion garments (item 3 in Table 2.2), rather than in transforming the design of clothes to be less readily disposed. Yet re-processing garments is costlier and more energy intensive than repair and re-use.

181. Ellen MacArthur Foundation, "Make Fashion Circular," 2017, accessed October 1, 2018, <https://www.ellenmacarthurfoundation.org/our-work/activities/make-fashion-circular>



Key Ambition	Strategy for implementation
1. <i>Phasing out substances of concern and microfiber release</i>	Align industry efforts and coordinate innovation to create safe material cycles. Drastically reduce plastic microfibre release.
2. <i>Transforming the way clothes are designed, sold and used to break free from their increasingly disposable nature</i>	Scale up short-term clothing rental. Increase clothing utilisation further through brand commitments and policy.
3. <i>Radically improving recycling by transforming clothing design, collection, and reprocessing</i>	Align clothing design and recycling processes. Pursue technological innovation to improve the economics and quality of recycling. Stimulate demand for recycled materials. Implement clothing collection at scale.
4. <i>Making effective use of resources and moving to renewable input</i>	using renewable feedstock for plastic-based fibres and regenerative agriculture to produce any renewable resources. transitioning to more effective and efficient production processes

TABLE 2.2. ELLEN MACARTHUR FOUNDATION'S AMBITIONS FOR A NEW TEXTILES ECONOMY

A circular economy cannot be achieved by adding eco-efficiencies into an existing linear business model, instead it requires new collaborative business models.<sup>182</sup> For example, H&M Group is working with textile recyclers to develop new technologies for fibre reclamation.<sup>183</sup> One of the challenges of transitioning to a circular economy is highlighted in the *2017 Sustainability Report* by H&M Group, where it is noted that "viable recycling solutions for many types of textile fibres – especially blended fibres – have either not been invented yet or are not commercially available at scale."<sup>184</sup> In response, H&M Group state they are "creating demand" for these solutions, and working with remanufacturing industry partners on innovative solutions.<sup>185</sup> New technologies and industry collaborations as supported by the Make Fashion Circular initiative are imperative to achieving a circular economy in the future. However, it is insufficient to address the "demand" H&M is currently creating: the alarming amount of unsold clothing they have already amassed. Therefore, in addition to the objectives of a

182. Michael Leube and Dominik Walcher, "Designing for the next (Circular) Economy. An appeal to renew the Curricula of Design Schools," *The Design Journal* 20, no. sup1 (2017/07/28 2017), <https://doi.org/10.1080/14606925.2017.1352999>, p.S495

183. H&M Group, *Sustainability Report* (2017), [https://about.hm.com/content/dam/hmgrouppublic/documents/masterlanguage/CSR/reports/2017%20Sustainability%20report/HM\\_group\\_SustainabilityReport\\_2017\\_FullReport.pdf](https://about.hm.com/content/dam/hmgrouppublic/documents/masterlanguage/CSR/reports/2017%20Sustainability%20report/HM_group_SustainabilityReport_2017_FullReport.pdf).

184. H&M H&M Group, *Sustainability Report.*, p.34

185. H&M H&M Group, *Sustainability Report.*, p.34

circular economy, it has been suggested that complementary actions are needed in energy efficiency, dematerialisation and consumer sufficiency.<sup>186</sup>

Despite the centrality of the user to a truly cyclical system of production and consumption (Figure 2.6), current industry practices continue to focus on those strategies that best fit the established linear economic model. Significantly, in their efforts to produce more sustainable fashion products, that the rapid cycles of fashion taste change mean those garments are likely to be quickly discarded, remains unchallenged. As identified in the Comparison Of Design Strategies Proposed In A Cross-Section Of Research Literature (Appendix 2), changing habits of use to reduce wastefulness is considered by proponents of sustainability within the sector, to be beyond the remit of design.<sup>187</sup>

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### 2.5.1 DESIGN FOR A CIRCULAR ECONOMY

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While it is the consumer that is central to the circular economy diagram, as the protagonist throughout most of the garment lifetime, their actions with the garment are shaped by the decisions made during its production, the nexus of which is the design phase. It is at the point of design that materials are gathered and manufactured into garment form, comprising decisions on which fabrics and trims to use and where and how to produce it. These decisions affect how the garment can be cared for (machine, hand or dry clean), how long it will last (durability of components and construction) and what end-of-life scenarios are possible (quality high enough for re-use, design for disassembly and recycling). In this position, the designer has great opportunity to direct design for sustainability in use. Despite the availability of academic research advocating for greater attention to the potential of design to impact consumption behaviour, this opportunity is not yet well explored within the transitional movement towards the circular economy in fashion. This is likely due to the challenge to existing modes of practice such a re-evaluation of the nature and purpose of design processes.

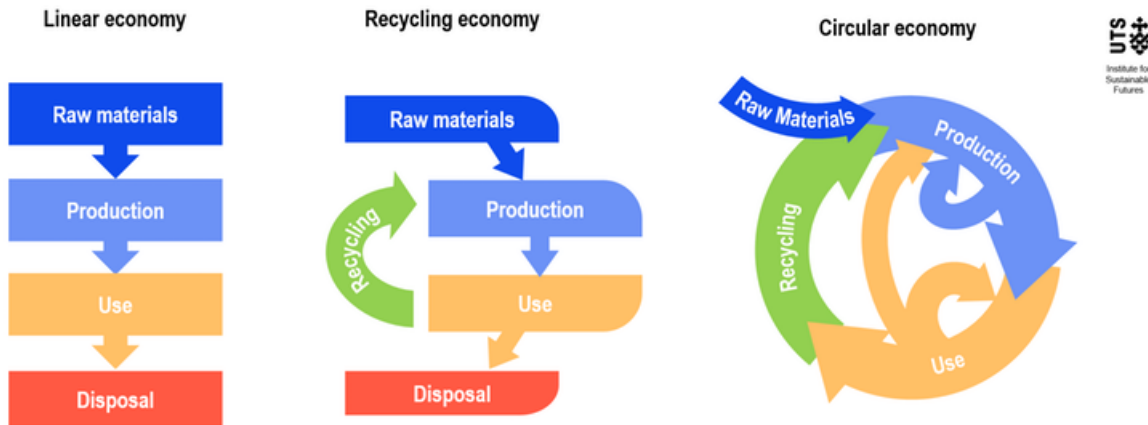
In between the linear and circular systems, is a 'recycling economy',<sup>188</sup> in which some material flows are captured after use and returned into what remains an essentially linear system. In Figure 2.7, the recycling economy appears between the linear and the circular indicating some improvement on the former, while demonstrating that a truly circular economy relies on greater action within the use phase which must necessarily involve greater cooperation between producers and consumers. It would be almost impossible to have an economy with a completely closed loop. An expanding number of this type of diagram reflect a need to more accurately depict the recycling economy as a stepping stone from a linear to a circular economy.

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186. Geissdoerfer et al., "The Circular Economy – A new sustainability paradigm?."

187. Brismar, "Circular Fashion."

188. Government of Netherlands, "From a linear to a circular economy," accessed December 14, 2018, <https://www.government.nl/topics/circular-economy/from-a-linear-to-a-circular-economy>

FIGURE 2.7. LINEAR, RECYCLING AND CIRCULAR ECONOMIES. <sup>189</sup>

189. Image by University of Technology Sydney's Institute for Sustainable Futures, adapted from the Netherlands Government-wide Programme for a Circular Economy, in Jenni Downes, "The planned national waste policy won't deliver a truly circular economy," October 1, 2018, accessed 14 December, 2018, <https://theconversation.com/the-planned-national-waste-policy-wont-deliver-a-truly-circular-economy-103908>.

## 2.6 THE GARMENT LIFE CYCLE

Sustainability understood as sustain-ability brings a new lens to evaluating existing strategies of fashion design for sustainability. Through literature review, it was established that the unsustainability of fashion is generally explored in relation to the garment life cycle, segmented into the stages of production, use, and disposal. Life-cycle assessment has emerged as a quantitative measure used to assess the environmental impacts of materials and products, fundamental to the implementation of sustainability. It is a complex and detailed process usually undertaken by experts and is therefore costly and time consuming. Life-cycle assessment has made apparent the environmental impacts of garment production, consumption and disposal, drawing attention to the energy consumption of the use phase. For some garment types, this has been shown to be more intensive than the manufacturing phase.<sup>190</sup> The garment lifetime understood through a model of life cycle assessment commences with the production of the fibres from which the garment is made and concludes with its final disposal.

Payne's life cycle assessment garment diagram (Figure 2.8), shows three models of the garment life cycle: single use then disposal (blue), use, re-use then disposal (pale green), and use then recycling (dark green).

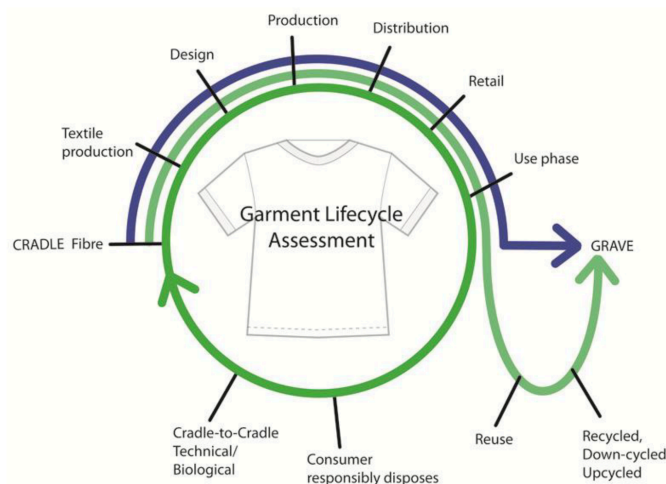


FIGURE 2.8. GARMENT LIFE CYCLE ASSESSMENT DIAGRAM © A. PAYNE

190. Adrian Chapman, *Mistra Future Fashion – Review of Life Cycle Assessments of Clothing*, Oakdene Hollins Research and Consulting Mistra (United Kingdom: Oakdene Hollins Research and Consulting Mistra, 21 October 2010 2010), [http://www.oakdenehollins.co.uk/media/232/2010\\_mistra\\_review\\_of\\_life\\_cycle\\_assessments\\_of\\_clothing.pdf](http://www.oakdenehollins.co.uk/media/232/2010_mistra_review_of_life_cycle_assessments_of_clothing.pdf). Kathleen Dombek-Keith and Suzanne Loker, "Sustainable Clothing Care By Design," in *Shaping sustainable fashion : changing the way we make and use clothes*, ed. Alison Gwilt and Timo Rissanen (London ; Washington, DC: Earthscan, 2011).

The blue life cycle is what is understood as typical of a garment: single use by one owner then disposal. It includes the production of the garment and its fabrics and trims, distribution to market and sale, use and disposal. The pale green line extends the use phase through re-use and recycling, prior to discard. The dark green line proposes a potentially cyclical life cycle for garments, in which garments are recycled into fibres for remanufacture. Payne and other researchers such as Gwilt<sup>191</sup> have referenced the garment life cycle assessment to discuss how designers can intervene at each stage to begin to transform conventional design practices from a linear to circular model. A range of life cycle assessment tools now exist to assist designers to evaluate products in development that draw on shared data resources about materials and production impacts.<sup>192</sup> While it is not feasible for a fashion designer within the independent boutique market level to conduct such an assessment of every garment to be produced within a collection, more generalised life cycle thinking offers a structure within which to approach the integration of design for sustainability strategies with product development.

A limitation of referencing diagrams such as these to inform sustainable fashion design, is that they are focused on the impacts of the product, its manufacture and disposal separate from the social practices within which it exists. Life cycle assessment schematics like Payne's demarcate the stages within the linear life cycle in equal segments: 'textile production' and 'distribution' are proportionally identical to 'use'. Also, while the entire production cycle of the garment is divided into segments from fibre manufacture to retail sale, the 'use' phase is not similarly segmented, despite it being the longest phase of a garment's life cycle.<sup>193</sup>

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191. This was the topic of Gwilt's PhD thesis. Gwilt, "Integrating sustainable strategies in the fashion design process: A conceptual model of the fashion designer in haute couture." LCA also provides the structure to Fletcher's seminal text, Fletcher, *Sustainable fashion and textiles: design journeys*.

192. See for example, Ecoinvent, "EcoDesign Tools," accessed December 31, 2018, <https://www.ecoinvent.org/partners/ecodesign-tools/ecodesign-tools.html>

193. Use is also a single phase in Gwilt's diagram (Figure 2.4), but included within it are practices of laundry and repair, providing some insight into routines that make up the use phase. More recently, Leube and colleagues have developed a detailed product Life-Cycle Assessment diagram that divides the use phase into sub-phases of purchase, application and end of use. However, greater detail is needed into specific clothing practices within the application phase to inform design intervention. Leube and Walcher, "Designing for the next (Circular) Economy. An appeal to renew the Curricula of Design Schools."

## 2.6.1 CLOTHING USE

Different garment types, and garments for different occasions, are worn by people of different demographic profiles, are used with varying intensity and have different life expectancies.<sup>194</sup> In 2001, Klepp conducted a small survey interviewing 24 women in Norway about 329 items of clothing, to investigate why women stop using clothing and wish to dispose of them.<sup>195</sup> In her analysis, Klepp identified that clothing goes through a series of phases of use (Figure 2.9). This model is significant because it highlights common patterns in use despite the complex differences between garment types and the occasions for wear. Klepp's model also enriches our understanding of the phases of life cycle assessment between retail, use and the grave. For example, Klepp identifies a phase between acquisition and first use when the garment is 'on hold'. During 'actual use' it may be rested for a period, then following last time use it remains in the wardrobe 'at mercy' until the decision is made to dispose of it.

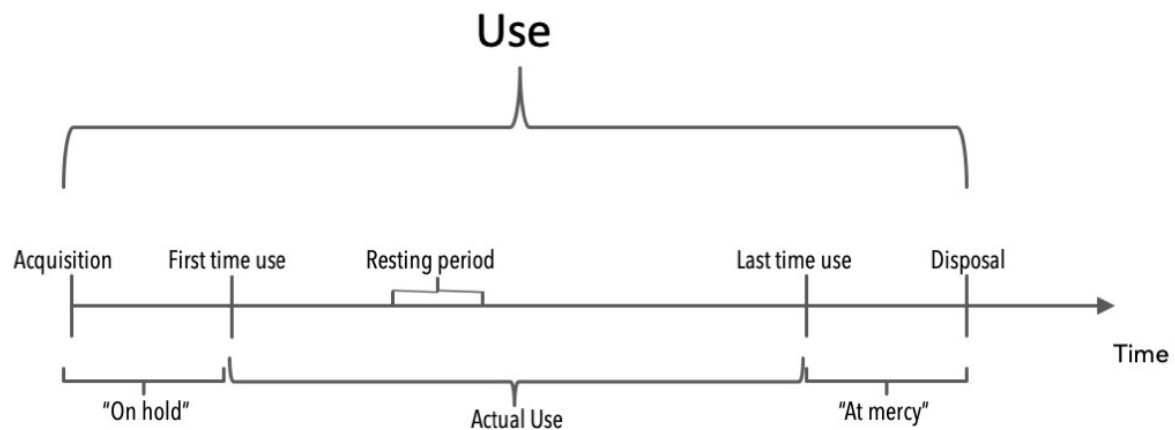


FIGURE 2.9. THE LIFETIME OF CLOTHES SHOWS THAT THE AVERAGE LIFESPAN OF A GARMENT INCLUDES PERIODS IN USE AND AT REST © KLEPP

Importantly for any discussion of clothing-fashion, when analysing the decision to dispose of the garment, Klepp noted a difference between garments disposed of for reasons of fashion over reasons of wear: fashion garments had a longer use phase, not because they were worn more actively, but remained 'at mercy' for longer before discard.<sup>196</sup> These garments remain in the wardrobe unworn, not because they are physically flawed or no longer fit, but because of changes in taste (Figure 2.10).

194. Edward Langley, Stefan Durkacz, and Simona Tanase, *Clothing Longevity and Measuring Active Use*, WRAP (UK: WRAP, 2013), [http://www.wrap.org.uk/sites/files/wrap/priv\\_download/Clothing%20longevity%20SUMMARY%20REPORT.pdf](http://www.wrap.org.uk/sites/files/wrap/priv_download/Clothing%20longevity%20SUMMARY%20REPORT.pdf).

195. Ingun Grimstad Klepp, *Why Are Clothes No Longer Used? Clothes Disposal in Relationship to Women's clothing habits* (Norway: Statens Institutt for Forbruksforskning (SIFO), 2001), [http://www.sifo.no/files/file48469\\_rapport2001-3web.pdf](http://www.sifo.no/files/file48469_rapport2001-3web.pdf).

196. Klepp, *Why Are Clothes No Longer Used? Clothes Disposal in Relationship to Women's clothing habits.*, p.29

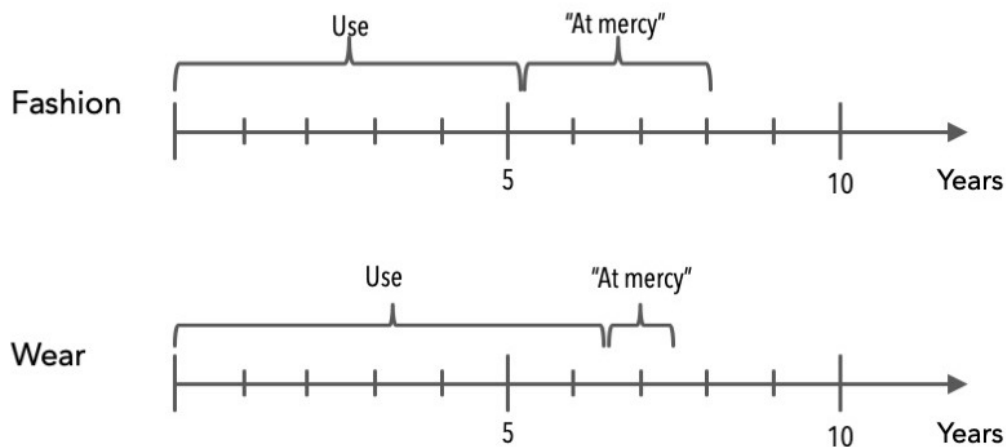


FIGURE 2.10. DIAGRAM DIFFERENTIATING BETWEEN GARMENTS DISPOSED OF FOR REASONS OF FASHION OR WEAR © KLEPP

The division of the use phase of the garment lifetime provides critical information to fashion design for sustainability not captured in a typical life cycle assessment diagram. That garments are used and rested is important to design in relation to both function and fashion: Where garments are rested because they need dry cleaning or ironing, might they be designed for less labour-intensive care practices? Where garments reflect the very latest fashion taste, might they be designed to be modular so that components can be removed and interchanged once their moment has passed? Particularly, when a garment is 'at mercy' what design strategies might enable tired garments to become fashionable again and return to active use? Although published over 15 years ago, the full value of this research to inform design for sustainability is yet to be realised.

A further limitation within the scarce literature<sup>197</sup> surrounding clothing divestment practices is a lack of clear language used to discuss the stages and decision points within. There is contention around what constitutes disposal and when, for example. The terms 'disposal' and 'discard' are used variously to describe the decision to divest the garment from the wardrobe and the acts of throwing it away into landfill, into the charity bin, or otherwise pass it on for re-use. In distinguishing between garments that are later re-used and those that are sent to landfill or otherwise destroyed, more specific language is

197. There have, however, been some publications during the period of this research study: Constanza Bianchi and Grete Birtwistle, "Sell, give away, or donate: an exploratory study of fashion clothing disposal behaviour in two countries," *The International Review of Retail, Distribution and Consumer Research* 20, no. 3 (2010/07/01 2010), <https://doi.org/10.1080/09593969.2010.491213>, H Goworek et al., "Consumers' attitudes towards sustainable fashion: Clothing usage and disposal," in *Sustainability in Fashion and Textiles: Values, Design, Production and Consumption*, ed. Miguel Angel Gardetti and Ana Laura Torres (Sheffield: Routledge, 2013), p.381, Chunmin Lang, Cosette M. Armstrong, and Laura A. Brannon, "Drivers of clothing disposal in the US: An exploration of the role of personal attributes and behaviours in frequent disposal," *International Journal of Consumer Studies* 37, no. 6 (2013), <https://doi.org/10.1111/ijcs.12060>, Sabine Weber, Jennifer Lynes, and Steven B. Young, "Fashion interest as a driver for consumer textile waste management: reuse, recycle or disposal," *International Journal of Consumer Studies* 41, no. 2 (2017), <https://doi.org/10.1111/ijcs.12328>

needed. 'Discard' is a more appropriate term for the decision of divestment, following which a number of options are available to the owner (Figure 6.2). After Laitala and Klepp, 'disposal' best describes the commitment of the garment into the waste stream, at the point it is no longer suitable for re-use.<sup>198</sup>

## 2.6.2 CLOTHING DISPOSAL

Insights into the reasons why clothing is discarded can also provide useful advice to designers seeking to avert the premature disposal of garments. Part way through the research study in 2015, Laitala and colleagues at SIFO, published the findings of a wardrobe study that sought to inform designers on methods of designing longevity into clothing-fashion, "Making Clothing Last: A Design Approach for Reducing the Environmental Impacts." In this study, the researchers interviewed participants and examined the garments being discussed. Usefully for designers, they discuss in detail, reasons garments are disposed. Their findings show that the longevity of the garments in the wardrobe and their active use is largely determined by physical garment attributes of material properties and fit, over fashionability (Figure 2.11).

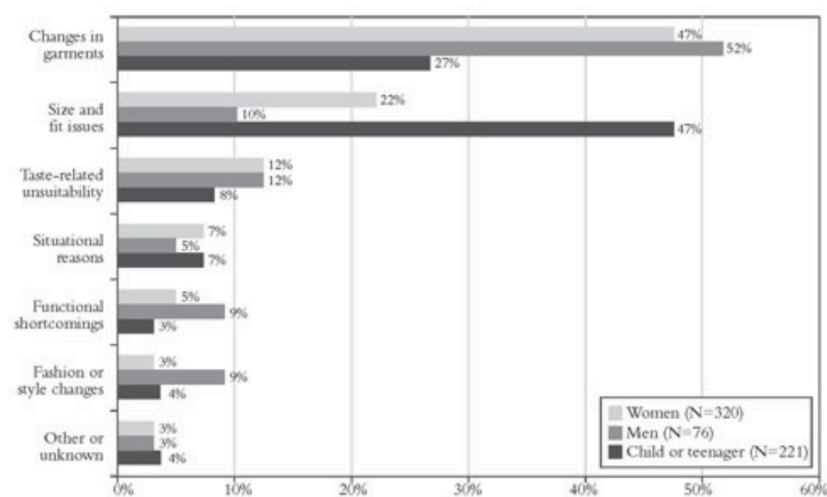


FIGURE 2.11. REASONS FOR CLOTHING DISPOSAL. © LAITALA AND COLLEAGUES

A summary of the reasons for disposal is provided in Table 2.2.<sup>199</sup>

198. K. Laitala and I. G. Klepp, "Clothing disposal habits and consequences for life cycle assessment (LCA)," in *Handbook of Life Cycle Assessment (LCA) of Textiles and Clothing* (Woodhead Publishing, 2015), p.347

199. See also Miriam Collett, Brigitte Cluver, and Hsiou-Lien Chen, "Consumer Perceptions the Limited Lifespan of Fast Fashion Apparel," *Research Journal of Textile and Apparel* 17, no. 2 (May 2013 2013)



Reason	Example
<i>Changes in garments</i>	the garment had a hole or was torn followed by generally worn appearance
<i>Size and fit issues</i>	owners had grown out of their clothing clothing never fitted well to start with
<i>Taste-related unsuitability</i>	clothing has a style or colour that the wearer does not like
<i>Situational reasons</i>	the owner having several similar or better garments life situation has changed thus having a change in needs for clothing. e.g. changing jobs
<i>Functional shortcomings</i>	garments is uncomfortable (physically), itching not warm or waterproof enough for the intended use
<i>Fashion or Style changes</i>	garments are disposed of because they are out of fashion or otherwise outdated, changes in own style (as it can be connected to changes in fashion)

TABLE 2.3. SUMMARY OF LAITALA AND COLLEAGUES' EXPLANATION OF THE REASONS FOR CLOTHING DISPOSAL.

While the word 'change' is listed in relation to fashion or style, in fact all reasons provided relate to changes that have occurred since the garment was acquired. Either the garment has changed, or the wearer has changed- either physically, in that they can no longer fit into the garment, or in their attitude to the garment- that it no longer suits them or reflects more recent notions of fashionable dress.

These findings are in keeping with the 2012 Waste and Resources Action Program (WRAP) report from the UK, *Valuing Our Clothes* which found, "In the average household, some 30% of clothes, costing over £1,000<sup>200</sup> to purchase, have not been worn for at least a year, most often because they no longer fit – four in five adults own some items which they no longer wear due to fit or need for alteration."<sup>201</sup> The advice to designers these reports offer is to suggest that design for repair and re-use is a fashion design for sustainability strategy with great potential.<sup>202</sup> In short, fashion designers should pay more attention to the functional clothing attributes of the fashion they design to extend the garment lifetime.<sup>203</sup>

200. Approximately AU\$1830

201. Waste & Resources Action WRAP, *Valuing Our Clothes: the true cost of how we design, use and dispose of clothing in the UK.*, p. 20

202. Kirsi, Boks Laitala, Casper, Klepp, Ingun Grimstad, "Making Clothing Last: A Design Approach for Reducing the Environmental Impacts," *International Journal of Design* 9, no. 2 (2015-08-30 2015), <https://doi.org/http://ijdesign.org/ojs/index.php/IJDesign/article/view/1613>, Niinimäki and Hassi, "Emerging design strategies in sustainable production and consumption of textiles and clothing.", Rissanen in Gwilt and Rissanen, *Shaping Sustainable Fashion: changing the way we make and use clothes.*,

WRAP, *Design for Longevity: guidance on increasing the active life of clothing*, Waste & Resources Action Programme (2013), [http://www.wrap.org.uk/sites/files/wrap/Design%20for%20Longevity%20Report\\_0.pdf](http://www.wrap.org.uk/sites/files/wrap/Design%20for%20Longevity%20Report_0.pdf).

203. Hethorn and Ulasewicz, *Sustainable fashion - why now?: a conversation exploring issues, practices, and possibilities*. quoted in Gwilt, "Valuing the Role of the Wearer in the Creation of Sustainable Fashion.", p.84

### 2.6.3 DURATION OF THE GARMENT LIFETIME

In addition to patterns of garment use, the duration of garment use is also critical to designing for extended garment lifetimes. During the period of this research study, WRAP<sup>204</sup> and SIFO<sup>205</sup> have been researching and publishing about clothing lifetimes, analysing how garments are used and for how long. WRAP has released reports based the life cycle assessments of garments aimed at reducing the carbon water and waste footprint of the clothing sector. The findings are oriented for both the industry in the "Clothing Longevity Protocol" report, and the public in the more consumer-focused "Love Your Clothes" report. SIFO's research into garment life cycle assessment and domestic clothing practices complements the work of WRAP. Laitala and colleagues note the wide difference in the reported average lifespan of clothing: ranging from 1-3 year for some garments, up to 7 years for others, and in one case as high as 15.2 years for skirts and dresses. From this they further note an overall average of 3.3 years or 5.4 years, but conclude that, "Lack of incomplete data and leads to incomplete life cycle assessment studies and the fact that we do not know enough about what contributes to clothing longevity."<sup>206</sup> Despite this, both SIFO and WRAP champion the extended use of clothing as a strategy for sustainability.

### 2.6.4 THE BENEFITS OF EXTENDED CLOTHING USE

In the report 'Valuing Our Clothes' published by WRAP in 2012, the authors argue that designing garments for increased longevity has the potential to significantly reduce the resource consumption associated with the production, care and disposal of clothing.<sup>207</sup> Their research demonstrates that in the United Kingdom, extending active use by nine months leads to a saving of 20-30% on carbon, water and waste footprints.<sup>208</sup> This saving occurs through the conservation of energy and materials by reducing the need for new clothing and by withholding garments from landfill. According to WRAP, only "modest" changes across the clothing life cycle are needed to reach this figure: production and

204. Langley, Durkacz, and Tanase, *Clothing Longevity and Measuring Active Use.*

WRAP, "Love Your Clothes," 2014, accessed June 18, 2016, <http://loveyourclothes.org.uk/>; WRAP, *Clothing Longevity Protocol*, Waste & Resources Action Programme (2014), [http://www.wrap.org.uk/sites/files/wrap/Clothing%20Longevity%20Protocol\\_0.pdf](http://www.wrap.org.uk/sites/files/wrap/Clothing%20Longevity%20Protocol_0.pdf); WRAP, *Design for Longevity: guidance on increasing the active life of clothing*; WRAP, *Valuing Our Clothes: the true cost of how we design, use and dispose of clothing in the UK*; Fisher, James, and Maddox, *Benefits of re-use case study: clothing*

205. K; Grimstad Klepp Laitala, Ingun, "Environmental improvement by prolonging clothing use period " (Towards sustainability in the Textile and Fashion industry, Copenhagen 26-27 April 2011 2011); Kirsi Laitala and Ingun Grimstad Klepp, "Environmental and Ethical Perceptions Related to Clothing Labels Among Norwegian Consumers," *Research Journal of Textile and Apparel* 17, no. 1 (Feb 2013 2013); Kirsi Laitala, "Consumers' clothing disposal behaviour – a synthesis of research results," *International Journal of Consumer Studies* 38, no. 5 (2014), <https://doi.org/10.1111/ijcs.12088>; Laitala, "Responsibility without means."; Laitala and Klepp, "Clothing disposal habits and consequences for life cycle assessment (LCA)."; Laitala and Klepp, "Short Age and active life of clothing."; Laitala, "Making Clothing Last: A Design Approach for Reducing the Environmental Impacts."; Ingun Grimstad Klepp, Tone Skårdal Tobiasson, and Kirsi Laitala, "Wool as an Heirloom: How Natural Fibres Can Reinvent Value in Terms of Money, Life-Span and Love," in *Natural Fibres: Advances in Science and Technology Towards Industrial Applications: From Science to Market*, ed. Raul Fangueiro and Sohel Rana (Dordrecht: Springer Netherlands, 2016); Kirsi Laitala and Ingun Grimstad Klepp, "Clothing reuse: The potential in informal exchange," *Clothing Cultures* 4, no. 1 (// 2017), [https://doi.org/10.1386/cc.4.1.61\\_1](https://doi.org/10.1386/cc.4.1.61_1)

206. Laitala, "Responsibility without means.", p.135

207. Waste & Resources Action WRAP, *Valuing Our Clothes: the true cost of how we design, use and dispose of clothing in the UK.*

208. Waste & Resources Action WRAP, *Valuing Our Clothes: the true cost of how we design, use and dispose of clothing in the UK.*, p.2

fibre choices, life extension, laundry practices, re-use and recycling. They argue that the technology to implement these changes already exists and from a production perspective, need not dramatically increase costs or retail prices.<sup>209</sup>

Materials & garment supply Fibre, yarn, fabric and garment production, distribution and retail				In-use Use and re-use, laundry, storage				End-of-life Re-use, recycling, incineration, landfill				
Actions	Increase efficiency in production processes – reducing carbon and water use by 5% and cutting waste in fibre and yarn production, dyeing and finishing by 50%	Use more synthetic fibres – replacing 10% of cotton used with a 50:50 polycotton blend	Extend the useful life of clothes in the UK through design, use and re-use by 10% – equivalent to 3 months longer use	Wash clothes 10% less frequently	Wash clothes at a slightly lower temperature – reducing the weighted average from its current level (46°C) to 39°C	Use tumble dryer 30% less frequently in summer time	Increase average size of washing and drying loads by 0.3kg (9%) requiring 7% fewer loads	Re-use 5% more clothing at the end of its first life – increasing the proportion of clothes re-used from 48% to 53%	Recycle more fibres back into fibres for use in clothing by introducing 5% closed-loop recycling	Recycle 5% more clothing (to non-clothing uses such as wiping cloths and felts) – increasing the total amount of discarded clothing recycled from 15% to 20%	Cumulative % saving* (rounded)	
Carbon	4.1	0.4	7.7	2.6	1.4	1.1	1.4	0.7	0.9	0.5		
Water	5*	3	10	0.06	0.03	0	0.04	0	0	0		
Waste	1.3	1.7	8.8	0.1			0	0.7	0.06			
Drivers for change	These changes would all help make production more cost-efficient	Retailers and suppliers would be less vulnerable to changes in the market price of natural commodities. Reducing the impact of conventional fibre mixes would be an alternative approach	Consumers get more value out of the clothing they buy – and companies that produce clothes that last and look good for longer gain a positive reputation	Less electricity is required – so laundry costs and emissions are lower				Depending on how the clothing is re-used, this could produce a valuable income stream for charities, merchants and local authorities or new revenue opportunities for retailers	Increased recycling responds to national policy targets			

\* This figure is based on EITHER delivering 5% saving by making production processes more efficient in their use of water, OR achieving 6% saving from two specific interventions:

- improved irrigation in cotton production (e.g. increased use of drip feed irrigation) – which could save 1% of the global water footprint for UK clothing; and
- increased treatment of grey water or use of non-toxic textile dyes to reduce the grey water footprint in fabric production by 50%.

† It may not be possible to achieve all savings, as one action could displace the benefits of another to some extent.

FIGURE 2.12 WRAP'S PROJECTED REDUCTIONS IN GLOBAL FOOTPRINTS BASED ON MODERATE CHANGES IN CONSUMER HABITS AND BUSINESS PRACTICES.

When reviewing Figure 2.12, the most significant change is required at the consumer phase of the garment life cycle: changing laundry habits and divestment decisions. WRAP is positive about the possibility for successful behaviour change noting that their research found consumers value longer lasting clothing, seeking out clothing that is “made to last and looks good for longer.”<sup>210</sup> They further found that most would accept a reasonable cost increase for garments produced with improved sustainability. At the same time, they indicate that consumers have difficulty identifying durable clothing because of a lack of standardised measures to guide purchasing, e.g. “lasts 50 washes.”<sup>211</sup> This suggests that in addition to designing garments to withstand extended use, such a capacity needs to be made explicit to the wearer. Garment labelling and the potential to script a garment for extended use is extensively explored through practice investigations discussed in Chapters 3, 4 and 5.

209. Waste & Resources Action WRAP, *Design for Longevity: guidance on increasing the active life of clothing*, p.14

210. Waste & Resources Action WRAP, *Valuing Our Clothes: the true cost of how we design, use and dispose of clothing in the UK*, p.23

211. Waste & Resources Action WRAP, *Valuing Our Clothes: the true cost of how we design, use and dispose of clothing in the UK*, p.23

The body of research published by WRAP and SIFO provides fashion designers with considerable information on clothing lifetimes and consumer practices that can be directly applied to the existing fashion design sector, enabling a reorientation of design from design for sustainable *products* to design for the *conditions of sustainability* (after Fry, 1994).<sup>212</sup> It begins to show how designers can influence the use of garments, through a more holistic understanding of the garments' life cycle and the relationally of the design phase within that cycle. Although the designer is not the wearer of the garment, through their design decisions, they can contribute to sustainable use practices.

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212. Gill and Lopes, "On Wearing: A Critical Framework for Valuing Design's Already Made.", Tony Fry, *Remakings: ecology, design, philosophy* (Sydney: Envirobook, 1994).

## 2.7 FASHION DESIGN FOR EXTENDED USE

An extended garment lifetime might involve the purchaser wearing it for longer, or it might involve the garment being worn longer by changing hands from one wearer to another. There is evidence that shows fashion garments are more likely to be donated to charity than other types of clothing.<sup>213</sup> The lack of fashionability is considered a valid reason for discard from the wardrobe, but not for disposal into landfill, because a garment that is no longer fashionable to one wearer, is perceived to be potentially fashionable again to another when recontextualised within the second-hand market.

From the clothing life cycle assessment studies discussed above, it is apparent that the design of clothing-fashion for extended use, requires an approach to design that pays greater attention to the practical side of how garments are worn and cared for, not merely what they look like on the body.<sup>214</sup> Under pressure to rapidly produce constant novelty, fashion designers are frequently more concerned with garment aesthetics than clothing functionality.<sup>215</sup> Garment designs in production may undergo a fit-test to trial the garment style on a live model who is representative of the target market. This test checks the fit and design features of the style on the body. Rarely does this test involve actual users; instead, professional fit models are employed. Garment use has limited consideration within the conventional fashion design and production process: materials and trims are carefully selected to ensure the washing/ironing advice provided on the care labels is suitable for all garment components. However, the durability of the garment is not so consistently addressed.

### 2.7.1 DURABILITY

The durability of the garment being designed is considered during the design process in keeping with the target market profile and price point, informing decisions on acceptable fabric quality (pilling, holes, fading) and construction (seam and stitching strength, interlinings and linings), to avoid faulty returns during the expected garment lifetime. High quality garments may be designed with some provisions for alterations in fit and will include spare buttons, yarn and embellishments (for example, beads or sequins) to assist with repairs. Garments may also include reinforcements like rivets on the pockets of jeans. However, these measures are not consistently applied across the market. The popularity of 'fast fashion' has resulted in consumer acceptance of poorer quality make and materials, given the short life expectancy of fashion garments. There is little or no perceived need for repair of such garments which will wear out as they go out of fashion. While recycling is an option for these worn out garments, re-use is preferable. WRAP indicates that for every tonne of cotton t-shirts re-used, 12 tonnes of CO<sub>2</sub>e<sup>216</sup> are saved – compared to less than 1 tonne of CO<sub>2</sub>e saved by recycling the same

213. Laitala, "Making Clothing Last: A Design Approach for Reducing the Environmental Impacts.", p.013, Weber, Lynes, and Young, "Fashion interest as a driver for consumer textile waste management: reuse, recycle or disposal."

214. Laitala, "Making Clothing Last: A Design Approach for Reducing the Environmental Impacts.", p.105

215. Hethorn and Ulasewicz, *Sustainable fashion - why now?: a conversation exploring issues, practices, and possibilities*.

216. CO<sub>2</sub>e describes greenhouse gas emissions equivalent to the same amount of CO<sub>2</sub>.

quantity.<sup>217</sup> Therefore they propose that, "perhaps the most important step to tackle this culture of disposability is to create an environment where longevity is a desirable attribute of the product. This would require a cultural shift, driven by consumer re-education, corresponding marketing promotion and, perhaps, new business models."<sup>218</sup>

In his book, *Emotionally durable design: objects, experiences and empathy* (2005), Chapman discusses that green and eco design sought to create durable products with a reduced environmental foot print, but that the resulting products remained susceptible to perceived obsolescence. Chapman declares "there is little point designing physical durability into consumer goods if the consumer has no desire to keep them."<sup>219</sup> This idea of perceived obsolescence Chapman describes as being the result of a failed subject/object relationship.<sup>220</sup> He contends that while users' needs constantly change, most objects offer only static experiences of which we grow quickly tired. Therefore, Chapman argues that any design for sustainability agenda predicated on extended product lifespan, must consider emotional durability alongside physical durability, to circumvent the unintended consequence of creating more durable waste. While many of his examples are drawn from consumer electronics and white goods, when discussing patina, the aesthetic appeal of materials as they age, he discusses leather and denim as two clothing fabrics that become more desirable as they age and become more distressed: torn denim jeans, a worn leather jacket. The way these garments mould to the body through wear shows that fashion as a combination of static object and worn experience offers more than static objects. The challenge for design is whether emotional durable subject-object experiences can be designed into products. Ultimately, Chapman concludes that "Designers cannot craft an experience, but only the conditions or levers that might lead to an intended experience."<sup>221</sup>

Further, Fletcher cautions that strategies for durability that might be successful in relation to electronics or furniture, do not translate to fashion so simply. Partly because of the soft textiles of which garments are made, also the intimacy they share with the body mean that they have a personal status that is different to other household products which may bolster or undermine design strategies for extended use like sharing.<sup>222</sup> Fletcher goes on to say that when coupled with the role garments play in identity formation as compared to other products, "such differences warn against the wholesale transposition of generic durability approaches between product areas." However, Fletcher concludes that "while being mindful of the factors that govern a specific product's longevity, sharing knowledge and practice across product groups is likely to generate innovation." Therefore, the literature review was expanded beyond fashion design for extended use, to the broader field of product design.

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217. Waste & Resources Action WRAP, *Valuing Our Clothes: the true cost of how we design, use and dispose of clothing in the UK.*, p.26

218. Waste & Resources Action WRAP, *Design for Longevity: guidance on increasing the active life of clothing.*, p.14

219. Jonathan Chapman, *Emotionally durable design: objects, experiences and empathy* (London: Earthscan, 2005), p.52

220. Chapman, "Subject/Object Relationships and Emotionally Durable Design.", p.20

221. Chapman, "Subject/Object Relationships and Emotionally Durable Design.", p.65

222. Kate Fletcher, "Durability, Fashion, Sustainability: The Processes and Practices of Use," *Fashion Practice* 4, no. 2 (2012/11/01 2012), <https://doi.org/10.2752/175693812X13403765252389>, p.225

## 2.7.2 EXISTING DESIGN STRATEGIES FOR EXTENDED USE

A review of existing literature on product design strategies for extended use returns a range of approaches, succinctly categorised by Bocken, de Pauw and colleagues as: design for long-life products and design for product life extension.<sup>223</sup> The former includes: design for attachment and trust and design for reliability and durability, while the latter includes: design for ease of maintenance and repair, design for upgradability and adaptability, design for standardisation and compatibility and design for dis- and re-assembly (Table 2.4).<sup>224</sup>

<i>Design for long-life products</i>	Definition
<i>Designing for attachment and trust</i>	Products that will be loved, liked or trusted longer.
<i>Design for durability</i>	Physical durability, for example, the development of products that can take wear and tear without breaking down. Material selection for durability is an important part of the design process.
<i>Design for reliability</i>	Designing for a high likelihood that a product will operate throughout a specified period without experiencing a chargeable failure, when maintained in accordance with the manufacturer's instructions.
<i>Design for product life extension</i>	Definition
<i>Design for Maintenance and Repair</i>	Enables products to be maintained in tip-top condition: Maintenance is the performance of inspection and/or servicing tasks to retain the functional capabilities of a product. Repair is about restoring a product to a sound/ good condition after decay or damage
<i>Design for upgradability and adaptability,</i>	Designing products to allow for future expansion and modification. Upgradability is defined as the ability of a product to continue being useful under changing conditions by improving the quality, value, and effectiveness or performance
<i>Design for standardization and compatibility</i>	Creating products with parts or interfaces that fit other products as well
<i>Design for dis- and reassembly</i>	Ensuring that products and parts can be separated and reassembled easily. It is a strategy that can be applied to increase the future rates of material and component re-use.

TABLE 2.4. SUMMARY OF BOCKEN, DE PAUW AND COLLEAGUES' STRATEGIES OF DESIGN FOR LONG-LIFE PRODUCTS AND DESIGN FOR PRODUCT LIFE EXTENSION

223. Nancy M. P. Bocken et al., "Product design and business model strategies for a circular economy," *Journal of Industrial and Production Engineering* 33, no. 5 (2016), <https://doi.org/10.1080/21681015.2016.1172124>

224. Bocken et al., "Product design and business model strategies for a circular economy."

The lens of the garment lifetime further draws attention to the shared responsibility of producers and consumers of fashion to practice fashion with sustainability. Table 2.5 shows how the recommendations from WRAP<sup>225</sup> to extend the active life of clothing can be addressed through the application of the design for product longevity strategies developed by Bocken, de Pauw and colleagues. Examples are included to indicate what outcomes might be possible when design for product life extension is integrated into a fashion design process. The integration of strategies within fashion design practice for extended garment lifetimes is considered in detail in Chapters 4 and 5.

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225. Waste & Resources Action WRAP, *Design for Longevity: guidance on increasing the active life of clothing.*, p.3



	WRAP recommendation	Design for Long Life	Design for Life Extension	Example
1. <i>Size and fit</i>	"one of the primary reasons for discarding undamaged items is that they no longer fit. By designing clothes that can be easily adjusted to allow for reasonable variations in an individual's shape, designers can help increase longevity."	Design for attachment and trust Design for reliability and durability	Ease of maintenance and repair Design for upgradability and adaptability, Design for dis- and reassembly.	Dress with elasticated waistband accommodates fluctuations in body size. Always fitting comfortably, it is worn often.
2. <i>Fabric quality</i>	"higher quality fabrics are more likely to withstand wear and tear over a prolonged period. Clearly, the nature of that wear and tear depends on the way the item is worn; there are different expectations of childrenswear and occasionwear. But even within these different categories, fabric quality can have a significant impact on how well an item endures."	Design for reliability and durability	Ease of maintenance and repair, Design for standardisation and compatibility,	Lightweight fashion top is made from fabric comprising yarns of a longer staple fibre to be more resilient to abrasion and pilling. The inclusion of additional fabric in the hem allowance enables repairs and the all-over print disguises the mend.
3. <i>Colours and styles</i>	"while there will always be a higher turnover of fashion items, designers can help extend the longevity of many garments by using 'classic' or timeless styles and colours, that are less likely to go out of fashion."	Design for attachment and trust Design for reliability and durability	Design for upgradability and adaptability, Design for standardisation and compatibility, Design for dis- and reassembly.	A modular garment can be reconfigured to change appearance. Components from different garments can be combined. Interactivity provides fashion novelty.
4. <i>Care</i>	"longevity is directly affected by how garments are cared for. Designers and retailers have an opportunity to influence this by ensuring consumers are given appropriate advice on care and on opportunities for re-use and recycling."	Design for attachment and trust, Design for reliability and durability	Ease of maintenance and repair Design for upgradability and adaptability, Design for dis- and reassembly.	Garment is sold with delicates bag for machine washing. That garment maintains appearance and performance over time strengthens its appeal and it is worn often. Retailer accepts returns for recycling.

TABLE 2.5. DESIGN FOR LONG LIFE AND LIFE EXTENSION STRATEGIES MAPPED TO WRAP RECOMMENDATIONS FOR EXTENDING THE ACTIVE LIFE OF CLOTHING.

### 2.7.3 PARTICIPATORY EXPERIENCES IN DESIGNING SUSTAINABLE FASHION

Following the success of participatory design projects in related fields of design (particularly industrial design and architecture), researchers in sustainable fashion, like Fletcher, have speculated on the potential for user participation in the design process to foster extended use by strengthening the relationship people have with garments they had a hand in designing and/or making. Involving the consumer in the design decisions made, potentially results in a garment that is more fit for purpose, more suited the individual's taste, is potentially unique in its appearance and has the feel-good factor that comes from creating something yourself.

#### 2.7.3.1 OPEN DESIGN

Participatory design processes are described variously within the literature. In the *Designer's Atlas of Sustainability*, Anne Thorpe defines 'open design' as being a "process in which users are involved with designers in the design development of artifacts, although the degree of user participation and its means may vary widely."<sup>226</sup> This broad definition was taken as a starting point for a survey of existing participatory practices in the fashion design industry, published early during the research in the paper "Made to Keep: Product Longevity Through Participatory Design in Fashion."<sup>227</sup> This review identified a number of approaches to wearer participation in the fashion design process, some of which have a long history. For example, haute couture and home dressmaking both involve the wearer in creation of fashion garments. Garments are made-to-measure with input from the wearer on style details (the position of a waistline or the length of a sleeve for example), fabric choice and colour. The garment is cut and fitted to the individual figure. A return to these types of bespoke fashion design processes is a potential method of creating sustainable fashion. In the following section, three strategies of open design are discussed as having particular relevance to this research project: co-manufacture, Do-It-Yourself (DIY) manufacture, and mass customisation. Each of these methods arrive at the production of a personalised garment by allowing the wearer to have input into the design and, or, manufacture of the garment. This is followed with a complementary discussion of the practice of garment re-making, where existing garments are re-made anew.

#### 2.7.3.2 CO-MANUFACTURE

Co-manufacture is an alternative to traditional, made-to-measure fashion, through which the wearer is involved in the manufacture of the garment. Often this is undertaken in workshop environment, where experts guide amateurs to construct a garment. Usually, modification of the garment design by the wearer is encouraged as part of the construction process, to personalise the garment for visual appeal

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226. Ann Thorpe, *The Designer's Atlas of Sustainability* (Washington, DC: Island Press, 2007).

227. Jo Cramer, "Made to Keep: Product Longevity Through Participatory Design in Fashion," *Design Principles and Practices: An International Journal* 5, no. 5 (2011), <https://doi.org/http://ijg.cgpublisher.com/product/pub.154/prod.516>

and fit.<sup>228</sup> One example is *Make{able}* that was initiated by researcher Anja-Lisa Hirscher, "a project and an open collaboration to encourage everyone to become active makers of their own wardrobe."<sup>229</sup> Conceived as a part of her Masters Thesis project, Hirscher provides participants at *Make{able}* workshops with garments that need to be finished (called halfway garments), and assists participants in completing them to their own taste and fit. Says Hirscher:

*A Half-way product is intentionally unfinished by the designer, and thus leaves an open space for the end user to customise and finalise. You – as final user, are invited to participate and create items according to your own needs. For this reason we can offer everybody to become an active participant of the design process.*<sup>230</sup>

Hirscher and colleagues discuss co-manufacture participatory workshops as one approach to the emerging concept of 'social manufacturing' in fashion. With similarities to the above definition of open design, "Social manufacturing in fashion can be seen as an umbrella for large- and small-scale manufacturing with an emphasis on enabling consumers to play a more active role at different stages of the production process while creating new innovations in the design and manufacturing of fashion."<sup>231</sup> The emergence of this terminology during the research demonstrates the evolving nature of the discipline. In this thesis, the terminology 'open design' is used to broadly describe the full variety participatory acts of garment production, for its wide acceptance across the disciplines of design and computing. The related concept of 'open source design' is discussed in Chapter 5.

Hirscher and colleagues outline the benefits of co-creating garments with consumers as the opportunity to create garments with increased emotional value, to build consumers' skills in garment making and to offer consumers an alternative means of engaging with fashion beyond constant acquisition of new garments.<sup>232</sup> In addition to participatory workshops of co-manufacture, they discuss alternate "do-it-yourself (DIY)" and "do-it-together (DIT)" methods of social manufacture. In DIY manufacture, the consumer-maker works independently, while DIT describes consumer-maker networks of collaborative production.<sup>233</sup> The authors further suggest that these models of social manufacture are well suited to small scale business operations. Within the mapping of Contemporary Fashion Business and Consumer Practices, undertaken (Chapter 2), a number of key examples were identified and are discussed below.

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228. Hirscher, Niinimäki, and Joyner Armstrong, "Social Manufacturing in the Fashion sector: New value creation through alternative design strategies?," Holly McQuillan et al., "Make/Use: A System for Open Source, User-Modifiable, Zero Waste Fashion Practice," *Fashion Practice* 10, no. 1 (2018/01/02 2018), <https://doi.org/10.1080/17569370.2017.1400320>, Kendra Lapolla and Elizabeth B.-N. Sanders, "Using Cocreation to Engage Everyday Creativity in Reusing and Repairing Apparel," *Clothing and Textiles Research Journal* 33, no. 3 (July 1, 2015 2015), <https://doi.org/10.1177/0887302x15572877>

229. *make{able}*, "make{able}," accessed January 10, 2018, <https://makeable4u.wordpress.com/>.

230. *make{able}*, "Half-Way Clothing," accessed December 31, 2018, <https://makeable4u.wordpress.com/workshops/half-way-clothing/>

231. Hirscher, Niinimäki, and Joyner Armstrong, "Social Manufacturing in the Fashion sector: New value creation through alternative design strategies?."

232. Hirscher, Niinimäki, and Joyner Armstrong, "Social Manufacturing in the Fashion sector: New value creation through alternative design strategies?."

233. Hirscher, Niinimäki, and Joyner Armstrong, "Social Manufacturing in the Fashion sector: New value creation through alternative design strategies?."

## 2.7.3.3 DO-IT-YOURSELF (DIY) MANUFACTURE

London label *DIY Couture* is a leading example of DIY fashion design. Instead of manufacturing seasonal collections in volume for wholesale, the brand publishes their fashion collections as patterns only. The first collection was released as a series of booklets available digitally or in hard copy, while the second secured a publishing deal and is available as a book.<sup>234</sup> The designs and instructions are deliberately aimed at the novice sewer and the detailed instructions provided with each pattern are supplemented online with free Portable Document Format (PDF) tutorials of basic sewing techniques. A host of suggested resources offer further support and designer Rosie Martin constantly conducts workshops around the UK.

Design activist Otto Von Busch offers visitors to his website 'self passage', free participatory fashion design 'cook-books' that demonstrate how to subvert and opt out of the fashion system altogether. Best explained in his own words, for Von Busch:

*The >self\_passage< methods are practical applications of democratic-productive consciousness and empowerment saving the dying garments in the back of the wardrobe. The methods are cookbooks for reclaiming the skills and modes of production of fashion to short circuiting the flows of myth through the fashion system.*<sup>235</sup>

Here fashion is political, making comment on the "inter-passive system of contemporary consumerism." In this closed loop of production and consumption, the wearer is his or her own producer and no money changes hands. In fact, money otherwise spent on the purchase of a new garment is withheld from the commercial fashion system altogether.

While participation in the fashion design process through social manufacturing involves the consumer making or completing a garment prior to wearing it, it is also possible that mass-produced garments purchased 'off-the-peg' might be participatory in use. In 2008, Dutch designer Berber Soepboer created the *Colour-In Dress* with Michel Schuurman (Figure 2.13).<sup>236</sup> The black and white dress is sold with a set of coloured fabric pens so the wearer can colour it as they wish. If the temptation to colour it in all at once is resisted, the wearer can colour it in gradually over time, establishing an evolving relationship that could reflect moods, feelings and events in their life. The *Colour-In Dress* is an example of the type of "conditions or levers"<sup>237</sup> that might be designed into a garment to encourage the formation of an enduring relationship between the wearer and the dress. Further it demonstrates a means through which wearer participation might be simply introduced into the conventional mass-production industry model.

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234. Rosie Martin, "DIY Couture," (2009)

235. Otto Von Busch, "Self Passage: Recyclopedia reForms," 2005, accessed January 19, 2011, <http://www.kulturservern.se/wronsov/selfpassage/reforms/reforms.htm>.

236. Berber Soepboer, "Work,"

237. Chapman, "Subject/Object Relationships and Emotionally Durable Design.", p.65

*Image removed for copyright purposes.*

FIGURE 2.13. 'COLOUR-IN DRESS' (2008) BY BERBER SOEPBOER AND MICHEL SCHUURMAN

#### 2.7.3.4 MASS-CUSTOMISATION

Mapping Contemporary Fashion Business and Consumer Practices had further identified a number of fashion brands offering mass-customisation as a means to personalise a garment. Like the participatory examples above, mass-customisation is well suited to fashion design, positioned more or less a meeting point between the mass-produced and the bespoke. Like bespoke design, customisation allows wearers to have input into the design parameters of a garment by combining a range of design components selected from a pre-determined list. While customisation is not a new concept in fashion, the economy of scale offered by operating such a business model online, has seen a proliferation of virtual mass-customisation fashion businesses appear and disappear in recent years. At one end of the scale, the online format permits alterations to a style to ensure a better fit (Matchimony<sup>238</sup>) while at the other end, it replaces the lengthy face-to-face consultation with a dressmaker for a made-to-measure garment, enabling consumers to decide style, fabric and fit, (eShakti, Modern Tailor<sup>239</sup>). Mass customisation is by no means 'participatory design' in the true sense. Consumers make their 'design' choices from a pre-determined list of attributes, albeit a long one. Compared to the limited choices offered on the High Street (size and colour only), mass-customisation at the very least offers a way for people to alter the design of garments they like to better suit themselves. This has been made possible in product design on a large scale through web technologies that enable discourse between customers and design brands, and online systems that support the logistics of mass-customisation. While it does not directly address the quantity of fashion consumed by individuals, mass-customisation has the potential to make the mass-produced garment individually appropriate. If being able to choose the

238. Natasha Scanlon and Victoria Briggs, "Matchimony," 2015, accessed November 12, 2018, <https://matchimony.co.uk>.

239. "eShakti," "Modern Tailor," accessed November 12, 2018, [www.moderntailor.com/](http://www.moderntailor.com/).

length of a hem or the depth of a neckline prevents another poor off-the-peg purchase being left to languish in the back of the wardrobe, it contributes to sustainability.

Despite the potential the above examples suggest for systems of consumer participation in fashion design processes to establish meaningful engagement between wearers and garments, this area remains under-explored as a strategy of enabling sustainable clothing-fashion practices. In this study, open design strategies are explored as design for home manufacture, design for evolving engagement and design for customisation for their potential to contribute to extended use of fashion garments. The capacity for garment design to encourage participation during the use phase is the focus of the practice enquiry (Chapters 3,4 and 5) and contributes the key findings of the study (Chapter 6). To complete the survey of current theories and practices of designing sustainable fashion, the next section discusses the popular practice of re-making existing garments. This approach differs to those discussed above as it concerns the re-manufacture of existing garments into new garments.

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## 2.7.4 CONTEMPORARY PRACTICES IN RE-MAKING GARMENTS

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The potential for re-making as a design strategy for sustaining garments through extended lifetimes, involves extending clothing use beyond the point it is deemed no longer fit for its original purpose. At this point, the garment is typically considered to be at the end of its life and discarded either directly to landfill, or through donation to charity or gifting to family or friends.<sup>240</sup> Re-making as a form of re-use, addresses the issue of fashion waste by re-manufacturing discarded garments into new garments. It has been adopted by brands,<sup>241</sup> but also embraced by the online DIY community as 'up-cycling'.<sup>242</sup> Up-cycling tends to describe a process that re-makes the garment into an entirely new form that may or may not exhibit traces of the original garment.<sup>243</sup> Alternatively, a garment may be rejuvenated through an alteration to the existing garment style, with little change to its form or function. Therefore, in this study, the term 're-modelling' is used to broadly describe all processes that seek to modify the existing garment, while 're-making' is reserved for processes described above as up-cycling; where

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240. Bianchi and Birtwistle, "Sell, give away, or donate: an exploratory study of fashion clothing disposal behaviour in two countries."; Collett, Cluver, and Chen, "Consumer Perceptions the Limited Lifespan of Fast Fashion Apparel."; Klepp, *Why Are Clothes No Longer Used? Clothes Disposal in Relationship to Women's clothing habits*; Laitala and Klepp, "Clothing disposal habits and consequences for life cycle assessment (LCA)."; Lang, Armstrong, and Brannon, "Drivers of clothing disposal in the US: An exploration of the role of personal attributes and behaviours in frequent disposal."

241. Sass Brown, *Refashioned: cutting-edge clothing from upcycled materials* (London: Laurence King Publishing, 2013); Seager and Sanders, "Junky Styling."; Orsola de Castro, "From Somewhere," 1997, <http://blog.fromsomewhere.co.uk/>; Eileen Fisher, "Eileen Fisher Renew," accessed February 1, 2018, <https://www.eileenfisherrenew.com/>; Lanni Lantto, "Lanni Lantto Ecodesign," n.d., accessed February 1, 2018, <http://fashionredesign.com/>.

242. Jen Gale, "My Make Do And Mend Life," n.d, accessed August 19, 2016, <http://mymakedoandmendlife.com/category/slowfashion/>; Heather Valentine, "100 Ways to Upcycle your clothing," The Sewing Loft, 2015, accessed February 1, 2018, <https://thesewingloftblog.com/100-ways-to-upcycle-your-clothing/>; Jill, "600+ Clothes upcycling projects," Creating My Way To Success: how to use what you've got to get what you need, 2012, accessed February 1, 2018, <http://jembellish.blogspot.com.au/p/clothes-upcycling-projects.html>.

243. 'up' instead of 're'-cycling implies the original value or purpose of the item is maintained. e.g. recycled T-shirts become rags, up-cycled T-shirts remain as garments. Thomas, "From Green Blur to Eco-fashion: Fashioning an Eco-lexicon.", p.534

garments are deconstructed and reassembled into new forms, often in combination with components from other garments or the addition of new fabric.

The appeal of up-cycling as a fashion design strategy for sustainability can be attributed in part to the readily 'hack-able' nature of garments.<sup>244</sup> It is because garments are still predominantly made from woven or knitted textiles pieces joined by stitched seams, that they are ideally suited to repair and re-making. Garment textiles are readily available as replacement components, and there are the few tools required to perform a repair: domestic hand and machine sewing equipment is sufficient to produce a professional outcome.<sup>245</sup> A few common skills can repair multiple problems: seams, holes, missing buttons. For example, a basic hand stitch was used to make the alterations to keep *The Bird Dress*<sup>246</sup> in use: replacing the elastic, repairing the hem and adjusting the length of the belt. In addition, textiles are readily patched to maintain functionality with even the most rudimentary attempt proving serviceable (patching with available scraps at hand). With more skill and attention to detail (matching fabric colour and type, thread and stitching), the original visual appeal can be maintained. Both functionality and purpose of the textile item can be maintained through domestic practices of repair. This is perhaps why 'up-cycling' has long been the prevalent sustainable fashion design strategy amongst consumers. This suggests that there is a unique opportunity for sustainable fashion practitioners to develop expertise in re-making the already existing. Yet, despite its ready application to fashion, design for re-making is not a widely adopted fashion design for sustainability strategy. Instead, the possibilities for re-making a garment are constrained by style and fabrication decisions that consider only first-time wear.

In contemporary fashion practice, the most notable adaptation of these design and construction methods can be found in the work of London fashion label *Junky Styling*,<sup>247</sup> that created womenswear from second-hand men's suits throughout the 2000s.<sup>248</sup> Designers Annika Seager and Kerry Sanders adopted a method of deconstructing garments into parts to be reconfigured into a new garment. The outcomes of this method frequently exhibit components that reference the garment's former life (Figure 2.14). An alternative method of re-making garments involves the complete deconstruction of a garment into its textile pieces from which new pattern pieces are cut for re-assembly into a new garment form. Garments made with this method show no trace of the original garment form. Figure 2.15 provides an example of this method in the work of Canadian label *Antifactory*. The combination of different textile pieces cut from different knitted jumpers contributes to the visual appeal of the resulting garment.<sup>249</sup> The advantage of this approach is that it allows for small scale production of unique garments as the same pattern pieces may be cut from many different deconstructed garment panels.

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244. Otto Von Busch, "Fashion-able: Hactivism and engaged fashion design" (Doctor of Philosophy in Design University of Gothenburg, 2008), [https://gupea.ub.gu.se/bitstream/2077/17941/3/gupea\\_2077\\_17941\\_3.pdf](https://gupea.ub.gu.se/bitstream/2077/17941/3/gupea_2077_17941_3.pdf).

245. Peter Dormer, "The culture of craft: status and future," (1996), p.173

246. discussed in Chapter 1

247. Seager and Sanders, "Junky Styling."

248. The business closed in 2012.

249. This business has since closed.



FIGURE 2.14. DRESS MADE FROM RE-USED  
MEN'S SUIT PANTS BY JUNKY STYLING ©  
FRASER MOODIE 2012



FIGURE 2.15. TOP MADE FROM RE-USED  
KNITWEAR. © ANTIFACTORY

Alongside brands that re-make garments, a number of fashion brands now offer garment repair and alteration services. Leading examples include Nudie Jeans and Filippa K. Both brands also buy back unwanted garments, clean and repair them for resale in their boutiques alongside new collections.<sup>250</sup> Extending the scope of their in-store repair service, Junky Styling offered 'wardrobe surgery', to professionally re-model all types and brands of garments according to the wearers taste and specifications, for a fee. These types of in-store services are important to the normalisation of both repair and second-hand shopping as viable, fashionable alternatives to buying brand new garments.

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250. Filippa K, "Filippa K Collect.", Nudie Jeans Co., "Re-use," accessed October 10, 2018, <https://www.nudiejeans.com/page/re-use>.



## 2.7.4.1 RE-MAKING IN THE DIY COMMUNITY

In addition to professional garment re-making services, re-making existing garments is a popular consumer-led approach to practicing sustainable fashion. A proliferation of texts published in the past decade<sup>251</sup> adapt the methods of garment re-making described above for the home sewer. *Cool Couture Remake Dresses*<sup>252</sup> presents a series of re-make projects, for which specific garments must be sourced to complete each design (for example 3x XL T-shirts), while other texts adopt an approach more in keeping with re-making as a means to extend the life of garments already owned. The internet has facilitated growth in this area. There is a huge craft, sewing and dressmaking community online, where users share both the methods and outcomes of projects they have undertaken. Posts on the blog *Japan Couture Addicts* describe projects completed from the *Cool Couture Remake Dresses* book, demonstrating possibilities to the wider community, inspiring and encouraging participation.<sup>253</sup> When participating in the design or making of something, users gain new skills and knowledge which they can apply to future projects. By sharing their experiences others benefit; and are able to build on that shared knowledge, developing concepts further. The potential for online communities of practice to support and promote product longevity as a sustainable fashion design strategy will be discussed in Chapter 5.

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251. Elissa K. Meyrich, *Rip it!: how to deconstruct and reconstruct the clothes of your dreams* (New York: Simon & Schuster, 2006); Henrietta Thompson and Neal Whittington, *Remake it - clothes: the essential guide to resourceful living: with over 500 tricks, tips and inspirational designs*, ed. Neal Whittington (London: Thames & Hudson, 2012); Violette Room, *Stylish remakes: upcycle your old T's, sweats and flannels into trendy street fashion pieces*, [English edition] ed., *Upcycle your old tees, sweats and flannels into street fashion pieces*, (Tokyo: Tuttle Publishing, 2015); Brown, *Refashioned: cutting-edge clothing from upcycled materials*; Koko Yamase, *Cool Couture Remake Dresses* (Japan: Bunka Shuppan Kyoku, 2009).

252. Yamase, *Cool Couture Remake Dresses*.

253. crealicia, "Remake à la japonaise (2)," Japan Couture Addicts Blog, 2009, accessed November 18, 2018, [http://japancouture.canalblog.com/archives/livre\\_247/index.html](http://japancouture.canalblog.com/archives/livre_247/index.html).

## 2.8 CONCLUSION

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An investigation into the practices of wearing clothing-fashion has drawn attention to the limitation of current life cycle assessment models as references for practicing sustainable fashion design. Segmentation of the garment life cycle into phases of production, use and disposal, reveals the resource intensiveness of the use phase and the importance of use practices to the overall sustainability of a garment during its lifetime. Research has shown that extending the life of a garment by as little as three months leads to a 5-10% reduction in each of the carbon, water and waste footprints.<sup>254</sup> Yet a limitation of life cycle assessment diagrams, to inform design for extended use, is that they do not elaborate on the sub-phases of use with the same detail as they do for production. In practice, sustainable fashion design actions tend to focus on the sub-phases of production and end-of-life-scenarios. At a macro level, the importance of the user is similarly highlighted by their position at the centre of the circular economy diagram (Figure 2.6) yet within the fashion sector design strategies to impact use practices are under-developed. Instead industry-led efforts concentrate on supply chain efficiencies and post-consumer textile reclamation, approaches that bookend the existing linear system without challenging the scale of either production or consumption.

There is a lack of research into consumer use of garments, but that field is growing. The available data goes some way to detailing the use phase of the garment within the lifetime by explaining reasons that garments are either kept and worn or discarded. From acquisition to discard, a typical pattern of use emerges through which the garment is worn, rested and worn again before it is put aside for potential disposal. Research on clothing divestment practices reveals problematic definitions of disposal and discard as synonyms for the expulsion of the garment from the wardrobe. Similarly, the term waste would seem to extend from discard, including diverse strategies such as re-use (e.g. donation to charity), to disposal into landfill. It is proposed that the discarded garment understood as waste undermines the promotion of second-hand clothing-fashion as valuable material artefacts with potential to be fashion once more. Instead, a distinction should be drawn between these descriptors, in keeping with possible end-of life-scenarios. Discarding a garment from the wardrobe need not result in disposal into the waste stream. Instead, the garment can be re-purposed through re-use, re-making or re-circulation through second-hand channels to extend its useful life. It follows that a garment does not have multiple lives as often implied through recycling initiatives (Figure 2.16) but one life, defined through an extended life cycle of use and re-use.

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254. Waste & Resources WRAP, *Valuing Our Clothes: the true cost of how we design, use and dispose of clothing in the UK*.



FIGURE 2.16. ON THIS CLOTHING BIN, ONE-TIME OWNERSHIP OF A GARMENT IS SYNONYMOUS WITH A GARMENT LIFETIME.

Within the sub-phases of garment use identified by Klepp, a key moment for design for sustainability to extend the life of the garment is when the garment is 'at mercy' prior to discard.<sup>255</sup> While typical approaches to design for product longevity discussed earlier consider ways to engage the user with the product for a longer duration, it is proposed that for clothing-fashion, an equally appropriate approach is to design for re-use by subsequent wearers. Potentially, this could enhance and extend existing practices of garment divestment through donation to charity, selling second-hand and passing on to friends and family. This is particularly relevant to clothing-fashion that is more likely to be donated than other kinds of clothing. In addition, although clothing-fashion sometimes finds a new wearer, it is rarely designed for it. Once worn but before being worn again, garments may need repair or alteration. It is important to keep in mind that the first owner had some reason for discarding the garment. If the design predicts the likely wear of the garment, then the capacity for future adaptations that may be necessary or desirable could be incorporated at the design phase. The same strategies that might facilitate use by a second or third wearer, might also be useful in extending the first use. Including a capacity for change may help the garment keep pace with the changing needs of the wearer, therefore postponing obsolescence and disposal. What if a fashion garment could enable its own longevity through design?

For the past decade, leading researchers within the field of fashion design for sustainability have championed fashion design for extended use. However, while manuals and toolkits now exist to guide the transformation of fashion design practice for sustainability they offer little guidance on how to design for extended clothing-fashion use. Some researchers have suggested that it is not possible to

255. Klepp, *Why Are Clothes No Longer Used? Clothes Disposal in Relationship to Women's clothing habits*.

design for specific experiences, yet existing garment affordances like spare buttons and wide seam allowances enable alternate possible futures for garments in which they are repaired and worn again instead of being discarded. Consumers have embraced garment re-use and upcycling as methods of practicing fashion sustainability, yet frequently garment qualities inhibit what action might be taken. Although garments are repaired, altered and re-modelled, few are designed to support such practices. Similarly, while it is common for garments to be passed on from wearer to wearer through second-hand channels like donating to charity, selling second-hand or swapping, garments are not designed for long-term use by different wearers. These concepts and ideas will be further explored throughout the thesis in discussion of fashion design practice.

This chapter has examined existing literature and practice within the context of fashion design for sustainability. As a result, the following conclusions can be drawn about the current state of the field to inform this study. Examining clothing-fashion through the lens of social practice, provides an alternative understanding of dressing fashionably as the integration of new garments with those already existing in the wardrobe. In addition, definitions of sustainability have been discussed, noting that sustainability<sup>256</sup> is not located within the sustainable object but instead is the outcome of the relationship between people and things, in their context of use. Fashion understood as a social practice of wearing clothing in combination with sustainability, understood as an on-going condition, brings to the foreground the importance of the garment life cycle in designing for sustainability in fashion. Limitations within the current life cycle assessment models, indicate that there is a lack of research into the consumer use phase of clothing and more understanding of the distinct sub-phases of use are needed alongside a stronger connection between the design and use phases. Further, current fashion design for sustainability does not look beyond the initial use phase to design for the possibility of subsequent use phases. Finally, a wealth of manuals and toolkits have been developed however evidence of their ongoing testing and evaluation in practice appears to be missing, rendering them largely theoretical. This reveals a gap between theoretical models and practical applications. Exploring this gap will reveal that the garment holds unrealised potential to enable sustainable fashion futures within independent fashion design.

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256. Fry, *Design futuring: sustainability, ethics, and new practice*.

### 3 RESEARCH DESIGN AND PRACTICE

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*"What is interesting, and important, about design is that it is the practice of social construction. Designers make futures happen; they imagine a future and then materialize it, realizing a merely desirable possible as what appears in the end to be natural, a new way of existing with all the force of the inevitable."*

- Cameron Tonkinwise<sup>257</sup>

*"The researchers' evolving path through research and life is central to their conception of research."*

-Peter Dormer<sup>258</sup>

This research project adopts both qualitative and quantitative methods. In addition to the literature and practice review, and mapping of the existing fashion design for sustainability strategies undertaken in Chapter 2, the site of this study is my own fashion design practice. I am immersed within my own research project. Cycles of action and reflection within the research act back upon me, shaping both the researcher as well as the researched. As such, this project is a "personal journey of discovery" in Amanda Brew's sense of it being research that is "assimilated into the researcher's own life and understanding."<sup>259</sup> In support of this transformation, the research methodology is a combination of complementary strategies: research for and research through design,<sup>260</sup> action research<sup>261</sup> and reflective practice.<sup>262</sup> This multi-methodological approach is further extended through Fry's model redirective practice.

The chapter is divided into two parts, in order to separate the overarching methodologies from the specific methods of the study. The first part of the chapter provides an evaluation of existing methodologies within fashion and design practice and makes a case for adopting practice as a method within this study. This section outlines the conventional fashion design process as is generally practiced in the Australian fashion industry and as taught at design schools. Following this, the methodologies that frame the study are outlined: Action Research, Reflective Practice and Redirective Practice. The synergies between these mixed methodologies are explained as typical of design practice. The second part of the chapter is a detailed discussion of the Research Methods undertaken, described in two phases: Research for Design and Research Through Design. These parts discuss the practice-led components of the thesis in which existing ideas are investigated through activities of making, and new ideas that arise through the research study are explored via methods of 'design through making' to arrive at innovative outcomes. The Research for Design activities outline the methods and map the field of research to establish the parameters of the study. This includes a survey of fashion consumers

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257. Cameron Tonkinwise, "Only a God Can Save Us – Or at Least a Good Story: I ♥ Sustainability (because necessity no longer has agency)," *Design Philosophy Papers* 9, no. 2 (2011/07/01 2011), <https://doi.org/10.2752/144871311X13968752924554>, p.73

258. Peter Downton, *Design Research*, ed. RMIT University. School of Architecture and Design (Melbourne: RMIT Publishing, 2003). p.7

259. Angela Brew, *The nature of research: inquiry in academic contexts* (London ; New York: RoutledgeFalmer, 2001)., pp.24-26

260. Downton, *Design Research*.

261. Cal Swann, "Action Research and the Practice of Design," *Design Issues* 18, no. 1 (2002)

262. Donald A. Schön, *The reflective practitioner: how professionals think in action* (New York: Basic Books, 1983).

in Australia that extends knowledge around fashion practices within a local context. The Research for Design activities are explained in detail in this chapter. The second phase comprises Research Through Design, including: Repertoire Building Research and Research Through Fashion Design Practice. Repertoire building activities extend my professional fashion design 'know-how' through an historical survey of garments and dressmaking texts and the replication of garment artefacts and construction techniques, to investigate the potential of existing methods of designing and manufacturing garments for prolonged use. Communicating this capacity to the wearer is further explored in experiments that look at scripting use. The Repertoire Building Research activities are explained in detail in this chapter. Research Through Fashion Design Practice is outlined here but detailed in Chapters 4 and 5 as it comprises the main body of the thesis. In this chapter, the development of garment prototypes, a QR code garment label and a website is described as a sequence of experiments that test the findings of earlier research activities and lead to the significant contribution of the study.

## MODE OF STUDY

The study commenced as a practice-based PhD, with the anticipated outcomes being the development of a collection of garments for exhibition, supported by a dissertation. However, during the candidature, it became apparent that I was using practice as a method to test and evolve ideas that arose from the contextual review and research for design activities, rather than as a way to generate ideas. Therefore, the study mode changed to practice-led PhD, where the garments are presented within the thesis as methods of the study.

### 3.1 EXISTING FASHION PRACTICE

This study is situated within the methodological framework of redirective practice and aims to explore the potential of redirecting existing fashion design practices for sustainability.<sup>263</sup> To quote Fry, redirective practice "is nothing more or less than the orientation of one's practice toward sustainment"<sup>264</sup> in ways that act back on the practice itself as well as what the practice acts upon – which is to say that one's practice is placed under perpetual political direction."<sup>265</sup> As an overarching critical framework for the study, redirective practice implies a methodology of action research,<sup>266</sup> where the researcher is an active participant and the research direction develops iteratively in response to ongoing reflection-in-action.<sup>267</sup> Redirective practice and action research are described in more detail below.

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263. Fry, *Design futuring: sustainability, ethics, and new practice*.

264. 'sustainment' Fry goes on to define as 'the common good' of and beyond the human. Tony Fry, "Redirective Practice: An Elaboration," *Design Philosophy Papers* 5, no. 1 (2007/03/01 2007), <https://doi.org/10.2752/144871307X13966292017072>

265. Fry, "Redirective Practice: An Elaboration.", p.9

266. Swann, "Action Research and the Practice of Design."

267. Schön, *The reflective practitioner: how professionals think in action*.

The prevalent industry model of the fashion cycle is well documented by Jenkyn Jones<sup>268</sup> and indeed, the first edition of this text was a recommended reading for students when I started teaching at RMIT University (Figure 3.1). Jenkyn Jones' flow chart explains the steps of the fashion cycle commencing with trend forecasting through sourcing and design development, garment sampling and finally mass production, distribution and retail sale. The designer is positioned towards to the top of the chart, indicating that many of the subsequent steps are determined with their input. This suggests potential for the designer to effect change within the overall cycle. As discussed in Chapter 2, each of these stages within the conventional design process present opportunities for intervention in practices based on values of sustainability.

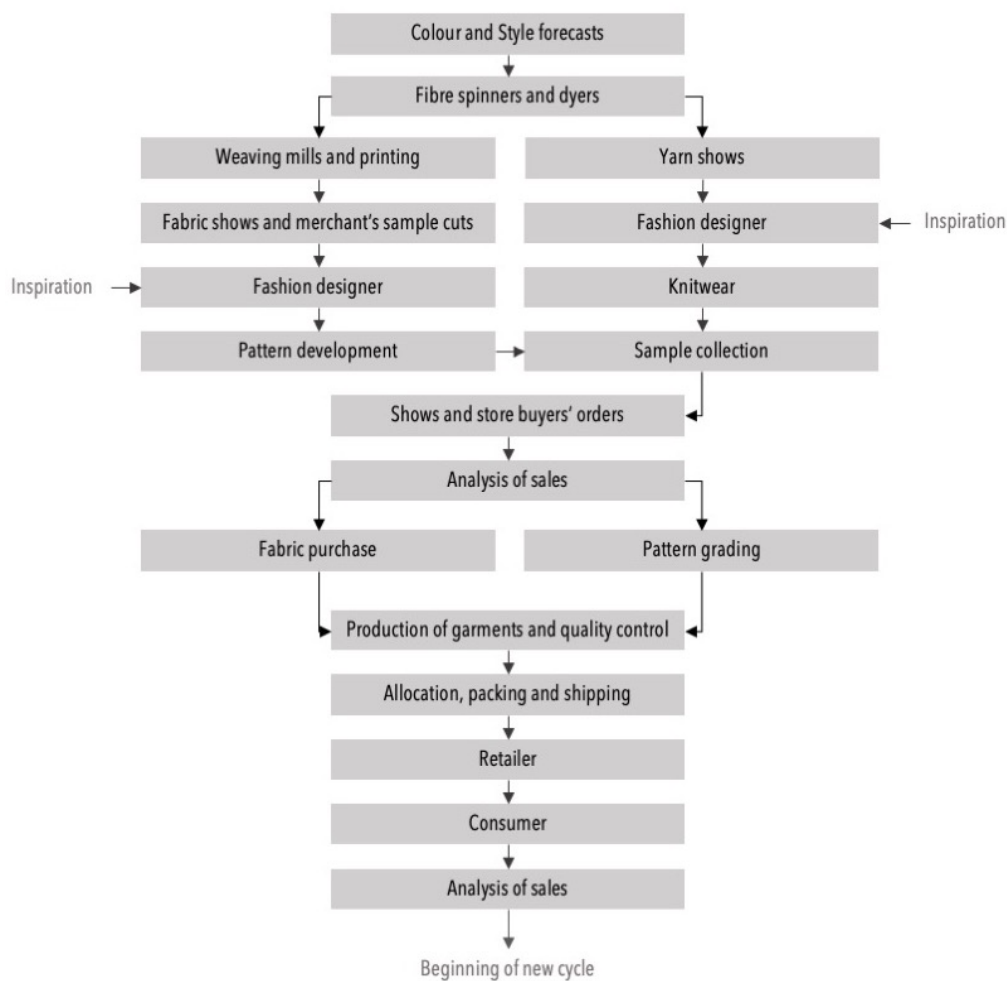


FIGURE 3.1. THE FASHION CYCLE © JENKYN JONES

268. Sue Jenkyn Jones, *Fashion design*, 3rd ed., Portfolio series, (London: Laurence King, 2011), p.152



### 3.2 ACTION RESEARCH: CYCLES OF PRACTICE

*The designer often telescopes a mass of fragmented bits of information and then -usually after a period of incubation- invents a coherent and often elegant proposition that embodies all or most of the rag-bag of bits.*

-Cal Swann<sup>269</sup>

Action research supports research within practice, where the researcher is a participant in the study, rather than the observer.<sup>270</sup> Action research is a reflexive process where the activities of the research act back on the research practice, enabling the transformation of practice that a redirection of practice for sustain-ability demands. Therefore it is well suited to projects where the outcome is undefined.<sup>271</sup> Swann describes action research as being similar to design as "Action research has been described as a program for change in a social situation, and this is an equally valid description of design."<sup>272</sup> This especially true of design redirected where the intention is to reveal the defuturing capacities of design, not merely create products with sustain-ability. Swann goes on to say that while action research can be used by designers to transform their own practice, it contributes to new knowledge when those transformations are documented as case studies and made available to the community of practice, as this thesis does.<sup>273</sup>

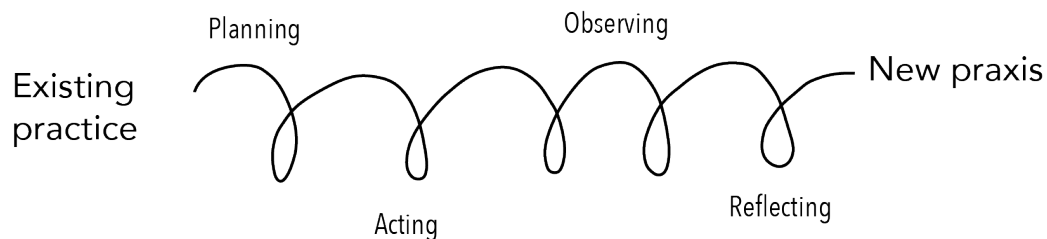


FIGURE 3.2. THE ACTION RESEARCH CYCLE (AFTER MEDLEY IN CROUCH AND PEARCE)

The action research process is cyclical, and according to Crouch and Pearce, generative in that it moves towards new praxis.<sup>274</sup> In the diagram at Figure 3.2, the cycle commences with planning, however Crouch and Pearce indicate that the cycle might begin with any of the phases.<sup>275</sup> This study was initiated with an observation phase undertaken before the formal commencement of the research degree. Within my commercial practice I had become concerned with the environmental impact of the materials and production methods I was using, but also the environmental impacts of the model of business in which I was practicing fashion design, particularly the significant amounts of post-consumer waste

269. Swann, "Action Research and the Practice of Design.", p.50

270. Christopher Crouch and Jane Pearce, *Doing Research in Design* (Oxford: Bloomsbury Publishing, 2013), p.144

271. Swann, "Action Research and the Practice of Design.", p.58

272. Swann, "Action Research and the Practice of Design.", p.56

273. Swann, "Action Research and the Practice of Design.", p.60

274. Crouch and Pearce, *Doing Research in Design.*, p.146

275. Crouch and Pearce, *Doing Research in Design.*, p.146



generated. I identified two components to my problematic situation, how I practiced fashion design and how fashion design is practiced at a systems level. I recognised that my commercial practice was entirely shaped by the system of fashion in which I had been trained at university, but that it did not match my personal values and experience of wearing fashion.

Reflecting on this, I determined that change within my existing design process (to use only ethically accredited fabrics and manufacturers perhaps) was insufficient, an attempt to add 'sustainable practices' onto my design practice's flawed foundations.<sup>276</sup> Instead I needed to unpick and re-make my fashion design practice with values of sustainability at the core – a practice within a practice. Therefore the research problem became formalised and a project of study planned to establish and answer the question, initiating a series of practice-led project-based investigations (the acting phase). The components of the study as a whole are diagrammed below to show the fundamental relationship between activities undertaken and their sequence in the timeline of the study (Figure 3.3). The blue text highlights the practice components of the study in which theories from the contextual review are trialled and the outcomes feed back into the theory being developed. The use of double ended arrows indicates the two-way flow of knowledge between the projects which were conceived iteratively as the research progressed through the cycle of observe-reflect-plan-act.

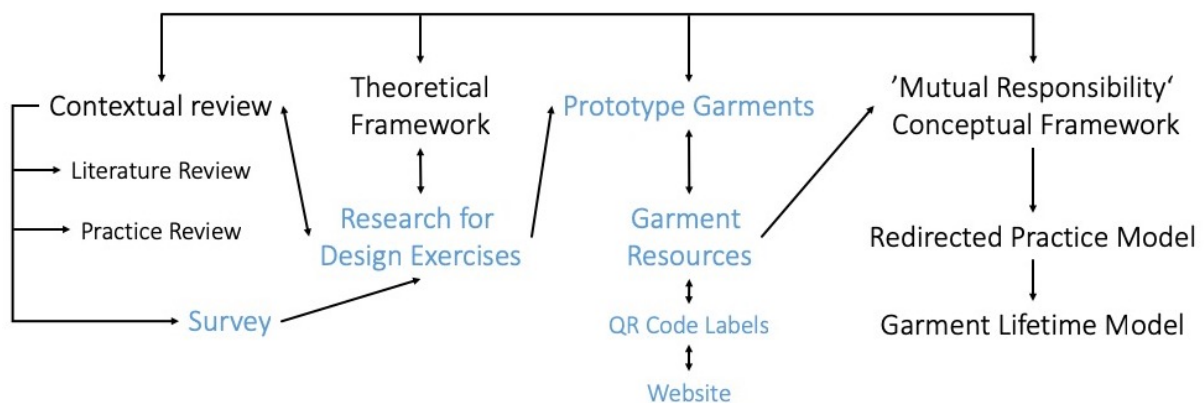


FIGURE 3.3. OVERVIEW OF THE STUDY INDICATING THE RELATIONSHIP BETWEEN RESEARCH ACTIVITIES UNDERTAKEN.

276. Fry, "Redirective Practice: An Elaboration.", p.26

### 3.2.1 ACTION RESEARCH IN FASHION PRACTICE

Action research is a particularly effective research methodology for fashion design given that fashion designers are in an almost unique position of being able to produce a resolved fashion garment entirely on their own. That is, a garment may be designed, prototyped and manufactured to a professional standard, even in a home environment using domestic sewing equipment.<sup>277</sup> Participating in design and production in this way, provides ample opportunity for the design activity to act back on itself and nudge the design in new directions of reflective practice. The fashion design prototyping process (known as sampling) permits rapid ideation and testing of ideas through the use of inexpensive materials to 'toile' the intended garment design. Toiles are constructed to be easily dismantled and reconfigured when the design process reveals the need for amendment – perhaps to correct a mistake, or act on a better idea that has emerged through the design process. In this way, the fashion design process adheres to the action research cycle of plan, act, observe, reflect, described above.

### 3.2.2 DESIGNING THROUGH MAKING: THE EXAMPLE OF THE LAYERED TOP

In creative practice, action research informs a process of 'designing through making', whereby "both designing and making activities are fully integrated and intrinsic to each other. The qualities of an object made through this process are directly related to the intention of the maker and the materials and processes they use to explore that intention."<sup>278</sup> *The Layered Top* (Figure 4.24) prototyped in the second phase of the study, tests the suitability of the redirected design values from earlier lower-body garment prototypes constructed from woven fabrics in an upper-body garment of knit<sup>279</sup> fabric construction. Further, it explores the potential of modular design in fashion (whereby parts can be removed and replaced) identified through the contextual review. It is described briefly here as an example of designing through making as action research and is discussed in more detail in Chapter 4, *The Living Wardrobe*.

An initial design concept sketch for this top shows a close-fitting, long sleeve top with contrast fabric cuffs, hem and collar and detachable sleeves, transforming the style from long sleeve to short sleeve at the discretion of the wearer (Figure 3.4). The sketch is rudimentary, serving to prompt the recall of an idea rather than specify a detailed concept. The details of the design are developed through patternmaking, as I reflect on the initial idea as it appears on the paper in front of me.<sup>280</sup> Patternmaking is a slow process (manual patternmaking especially), comprising many laborious and repetitive actions that provide ample space for reflection-in-action:<sup>281</sup> fleshing out the design (plan), noting how the

277. Dormer, "The culture of craft: status and future.", p.173

278. Katie Bunnell, "Designing through Making," *The Design Journal* 3, no. 3 (2000/11/01 2000), <https://doi.org/10.2752/146069200789390114>, p.1

279. cut and sew construction, not fully fashioned

280. This is not usual practice in a commercial fashion business where patterns are produced patternmakers who draft patterns according to exacting sketches. In that context patternmaking is a problem solving task of geometry and design interpretation.

281. Schön, *The reflective practitioner: how professionals think in action*.

design transitions from concept to reality (observing) and comparing the realised design to the initial design intention (reflecting). These reflections modify on-going action as necessary, perpetuating the action research cycle.

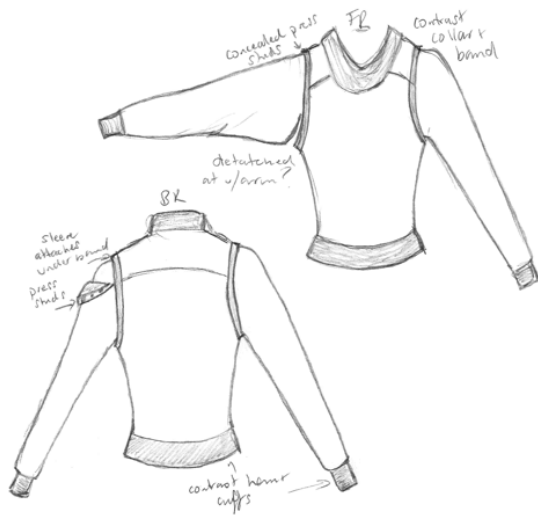


FIGURE 3.4. DESIGN SKETCH FOR THE LAYERED TOP

Sewing the prototype is a similarly reflective stage of the fashion design process. While the cut pieces of fabric prescribe the form of the outcome, reflection during construction invariably leads to changes to some aspect of the garment's design that may see pieces re-cut or the whole toile abandoned, unfinished. There are several toiles and part toiles of this garment that document the difficulty encountered in resolving the detachable sleeve mechanism. These toiles are numbered and dated (Figure 3.5) and when examined as a series, exhibit the evolution of my thought processes as I endeavoured to realise my design intent in the garment. The patterns are similarly catalogued, each amendment is dated and drafted in a different coloured pencil to distinguish the revised lines from the original lines (Figure 3.6). Each pattern variation can be matched to each of the toiles. The patterns and toiles are carefully archived for future reference, where reflection-on-action<sup>282</sup> may draw out useful information as yet unnoticed.

282. Schön, *The reflective practitioner: how professionals think in action*.



FIGURE 3.5. TOILES ARE LABELLED TO MATCH THE ANNOTATED PATTERN CHANGES.



FIGURE 3.6. PATTERNS ARE LABELLED TO PRESERVE THEIR CHRONOLOGY IN THE DEVELOPMENT OF GARMENT PROTOTYPES.

### 3.3 REFLECTIVE PRACTICE

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Fashion design is a professional practice that is at present aligned with Schön's concepts of 'reflection-in-action' and 'reflection-on-action', concepts taken from *The Reflective Practitioner, how professionals think in action* (1983). Reflection-in-action refers to the way in which a practitioner employs knowing-in-action (expertise as tacit knowledge) to the design activity in progress. Schön describes the design act as a 'reflective conversation with the situation' in which the designer responds to the "talk back" of the design process as it unfolds, modifying actions accordingly.<sup>283</sup> This is necessary because of the uncertain nature of design, that the outcomes of design activity may be other than anticipated and require correction, or potentially, the reframing of the problem. Reflection-in-action has shaped the way the practice investigations in this study were performed, consistent with the methods of my existing design practice. In this regard, my design process remains unchanged by the study as reflection-in-action equally serves redirective practice. At the same time as reflecting on my designing as I design, I reflect on the question: What will this design, design?<sup>284</sup>

The opportunity for reflection-on-action arises as the garment prototypes are completed. At this point, they may be evaluated with the aim of improving future practice. When I operated my fashion label, this evaluation was formalised in a fit test prior to volume manufacture. Once the style had been produced and sold to boutiques, a further evaluation of the garment would be conducted in response to sales figures and retailer feedback. These data informed whether the style was repeated and whether changes to fit, fabric, colour were needed. In this study, the garments prototyped are methods as much as they are outcomes of the research, therefore the design process is not as formal nor as neat and tidy. Instead, throughout this study, reflection-on-action has been undertaken at many stages, notably at the completion of the many design investigations that comprise the first phase of the research, and throughout the design-through-making process of the second phase of the study, where the completion of a toile or pattern punctuated the design process with a moment for reflection on the activity just undertaken.

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283. Schön, *The reflective practitioner: how professionals think in action.*, p.79

284. Fry, *Design futuring: sustainability, ethics, and new practice.*

### 3.4 REDIRECTIVE PRACTICE

Understanding the directionality of design and its potential to be “a pathfinding means to sustain action countering the unsustainable while also creating far more viable futures”<sup>285</sup> has been critical to the framing of this research project. Once design is understood to give or negate time, to have consequences both intended and unintended and thus that design is essentially always unfinished, practicing sustainable fashion design necessitates far greater change to established processes than the selection of eco-fabrics and ethical production facilities. Fry argues that for design to take the lead in securing a future, design, including all design practices, must be re-designed.<sup>286</sup> Fry rather emphatically calls for “...taking back the power of design and redirecting it.”<sup>287</sup>

Redirective practice requires a deliberate transformation of practice that commences with a self-reflective analysis of existing practice, its origin, composition and impacts in the world, followed by a re-making of that practice which may require some practices to be let go and new ones learnt, before the redirected practice is employed to engage with the world with ‘specifically directed transformative intent’.<sup>288</sup> Within practice, the research activities are undertaken through cycles of action-reflection, but always in response the question, ‘what will that which has been designed design?’<sup>289</sup> drawing attention to the consequences of the design activities. By repeatedly asking this question during the research study, and especially as each garment was prototyped, forethought of the future impacts of the garments I bring into being, has been embedded into my existing fashion design practice.

#### 3.4.1 DESIGN FUTURING

Fry has written extensively about redirective practice, particularly in *Design Futuring: sustainability, ethics and new practice* (2009). *Design Futuring* can be approached as manual for redirective practice and in this way, it has some similarities to the handbooks on sustainable design discussed earlier (Chapter 2). It first sets out the theory behind Fry’s case for the redirection of design, then provides a methodology for designers to go about the redirection of their practice. However, what sets it apart from existing approaches to design for sustainability is that it takes relational view of sustainability which extends the practice of design for sustainability beyond the object of design to consider the object in its context of likely use. Fry begins with an elaboration on practice and by extending the definition of design beyond the activity of planning and implementing new products,<sup>290</sup> to one of shaping the world. With reference to Bourdieu’s notion of *habitus*<sup>291</sup>, he describes the role of design in mediating our

285. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.7

286. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.6

287. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.10

288. Fry, "Redirective Practice: An Elaboration.", p.9, Fry, *Design futuring: sustainability, ethics, and new practice.*, p.174-175

289. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.34

290. Lois Frankel and Martin Racine, "The Complex Field of Research: for Design, through Design, and about Design" ( Design & Complexity, Université de Montréal, Canada, Design Research Society, 2010)., p.3

291. Habitus is ‘the way society becomes deposited in persons in the form of lasting dispositions, or trained capacities and structured

experience of the world, that we understand and interact with the world through the material culture of designed things. Design is both a response to the world but also shapes that world.<sup>292</sup>

This idea that the designed designs, is central to redirective practice. By way of example, Fry posits it is unlikely that Karl Benz, who is credited with the invention of the automobile, would have foreseen that his invention would go on to transform road networks, create cities, new manufacturing and transport industries, new leisure pursuits, and generate significant pollution.<sup>293</sup> Fry contends that understanding the relational nature of design is central to recognising and taking responsibility for the unsustainability of our anthropocentrism. Design redirected for sustain-ability asks 'what will that which has been designed design?'<sup>294</sup> and so brings into the remit of the designer the directionality of design, a responsibility that Fry declares "...changes not just the designer's role, but the very nature of design."<sup>295</sup> Adopting redirective practice as a methodological framework for this study, grounds the research project within a context of world shaping. It is a critical lens through which to evaluate the research practice as it unfolds, to guide design decisions in what should and should not be brought into being. Within my design practice, this way of thinking has led to much greater consideration of how garments are used, at the point of design. For example, when sketching *The Layered Top* (Figure 3.4), design decisions included questions like, if the top is cut close under the arms, how might it be protected from perspiration? If it is worn frequently, which parts are most likely to become soiled, and how might they be readily replaced? In this way, acts of design in the present, are connected to acts of wearing in the future.

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### 3.4.2 FRY'S DESIGNING IN TIME

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The question, 'what will that which has been designed design?'<sup>296</sup> locates the act of design within the product life cycle and creates an awareness of the relationally and directionality of design practice. It draws attention to the broader systemic issues of design's contribution to the environmental problems we face today but can also be asked of an individual act of design where the decision is to be made on what (or whether) to bring into being. Fry promotes using tools like 'back-casting' to predict desired futures and "design back from the future to the present"<sup>297</sup> to enable those futures to occur. This approach opens up speculative ways of thinking to envision and enact radical transformation of design practice for sustain-ability. In the context of this study, back-casting offers a possible means to move

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propensities to think, feel and act in determinant ways, which then guide them' Wacquant in Zander Navarro, "In Search of a Cultural Interpretation of Power: The Contribution of Pierre Bourdieu," *IDS Bulletin* 37, no. 6 (2006), <https://doi.org/10.1111/j.1759-5436.2006.tb00319.x>, p.16

292. Fry, *Design futuring: sustainability, ethics, and new practice.*, pp. 22-27

293. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.37-38

294. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.34

295. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.34

296. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.34

297. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.147

away from the 'lock in' of existing approaches to sustainable fashion design (see Chapter 2). This leads to the question: What will clothing-fashion design?

Fashion designers are familiar with working with notions of future time, they work seasons ahead of the retail market, predicting future tastes and trends to inform their designs. Yet this idea of future time in fashion is short sighted, looking forward a few years at most, and is blinkered in what it sees. Forecasting is used to inform the design of the fashion garment, principally its aesthetic qualities, with little thought to its impact in the world. In this study, the fashion design process of trend forecasting is explored for its potential to be redirected to predict likely use, i.e. 'use forecasting'. This view stretches the forecast in keeping with the idea of designing 'from the future to the present'<sup>298</sup> in consideration of "what potentialities beg interrogation."<sup>299</sup> For example, fabric choice can dictate cleaning methods for a garment, and design details can render a garment obsolete beyond a particular point in time. Thus the view of the future forecast is broad and considers intended and unintended consequences. In defence of this strategy that might be derided as attempting to predict the future, Fry points out that much of the future can be determined through what we know today.<sup>300</sup> Future impacts of current fashion industry practices are well understood: the pollution generated across the production supply chain and the post-consumer waste problem caused by excessive consumption. These issues are becoming increasingly hard for designers and producers of fashion to ignore, raising the issue of responsibility: who should take it and how.

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### 3.4.3 LEARNING FROM THE PAST

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While 'designing in time' is future facing in seeking to design for viable futures, it does so in part by learning from the past.<sup>301</sup> Fry notes that the advanced technological fix is not necessarily the only solution to the challenges of sustainability: "there is great deal of design potential in re-conceptualising existing, past and forgotten technologies."<sup>302</sup> This might include the reconceptualisation of tools and equipment (Fry's case study of a scythe reengineered)<sup>303</sup> but might also be applied to past practices, ways of doing and being. This concept aligns with Maller and Strengers<sup>304</sup> investigation of the resurrection of past social practices to meet new challenges of sustainability. In a study of migrant Chinese women in Melbourne, Maller and Strengers looked at how water saving practices learnt as young women in their home country where access to fresh water was limited, were taken up again when drought forced water restrictions in Melbourne. From this they suggest the potential for what they describe as dormant social practices to be resurrected. While their

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298. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.151

299. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.146

300. Fry, *Design futuring: sustainability, ethics, and new practice.*, pp.146-147

301. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.157

302. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.77

303. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.79

304. Cecily Maller and Yolande Strengers, "Resurrecting sustainable practices: using memories of the past to intervene in the future " in *Social Practices, Intervention and Sustainability*, ed. Yolande Strengers and Cecily Maller (United Kingdom: Routledge, 2015).



study focused on individual practices, in their conclusion, they speculate on the potential to resurrect dormant practices within the collective memory, practices that are known to an individual but may not have been practiced personally.

In this study, past practices of domestic clothing maintenance and production are explored for their potential to be reintroduced into contemporary garment use practices. Research methods of object analysis and literature review are used to expand my existing professional garment making skills and develop a repertoire of technical design and construction techniques to use in garment design and specification for manufacture. These are trialled in a series of sample garment designs. The methods developed draw on techniques of professional dressmaking and tailoring and domestic practices of garment repair and re-use, where the former seeks to enable the latter. Forecasting likely use and possible use informs how these techniques are incorporated into new designs. Asking, 'what is the likely future impact of this design in the world?' during the design phase of the garments directs the design development process to account for future use scenarios that enable sustainability. Sustainability is not located within the 'sustainable' object but instead is the outcome of the relationship between people and things, established in their context of use. Thus, redirective practice extends beyond the design practitioner, to impact those with which the practice comes into contact. For example, inclusion of an underarm shield in the layered top facilitates frequent long-term wear and therefore may contribute to fewer tops purchased in the future.

### 3.5 RESEARCH FOR DESIGN

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With reference to the work of Frayling, Peter Downton defines research for design as "...research that is carried out during the overall design process to support designing in whatever way the designer(s) regard as useful and this includes research intended to provide information and data that is necessary to successfully conclude the undertaking in question."<sup>305</sup> Research for design is generally undertaken in relation to a specific design project, but may be undertaken to advance design practice more generally in some way. In this study, while the project is the advancement of my own design practice, it advances knowledge of design practice for sustain-ability, and thus potentially informs practice beyond the PhD project. In relation to using design as a method to generate new ideas around design practice for sustain-ability, the following methods align with Downton's version as well as other scholars such as Frayling, and are outlined below.

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#### 3.5.1 CONTEXTUAL REVIEW

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Mapping the field through a contextual review informed a deeper understanding of contemporary theory and practice around design for sustainability in fashion. It further located fashion design for sustainability thinking within the broader field of design for sustainability, revealing synergies and gaps. The key issues of sustainability within the fashion industry were confirmed as being problems of pollution, waste and worker exploitation during production and post-consumer waste. In response, it became apparent that the prevalent industry approach to sustainable fashion design practice is product focused, seeking to produce garments using less environmentally harmful materials and processes without adequately addressing the challenge of excessive consumption. Fletcher's research into clothing use practices<sup>306</sup> was identified as a significant departure from product focused sustainable design, leading the shift in thinking within the research community from a focus on sustainable garment design to practices of use. It was noted that empirical research into use practices that might inform sustainable fashion design is limited, and few handbooks of sustainable fashion design present ways of designing for sustainable use.

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305. Downton, *Design Research.*, p.17

306. Fletcher, *Craft of Use: Post Growth Fashion.*

### 3.5.2 MAPPING

A mapping was undertaken of fashion design for sustainability strategies identified through the literature review (see Appendix 2). This summarised the prevalent industry view of possibilities for sustainable fashion design practice. The mapping was conducted using Microsoft Excel software to tabulate the data and identify consistencies and discrepancies. The mapping finds that most approaches are similar in pursuing the sustainable production of fashion garments and limit their consideration of the designer's input to garment conception, production and sale, excluding use. This finding is supported by a further visual mapping of the field of commercial fashion practice against principles of design for sustainability that positioned real world examples against key themes in design for sustainability thinking (Figure 2.5). Two clear parts to the map emerged: on one side are those brands that pursue sustainable production methods (and tend to emphasise sustainability as a value within their business), while on the other side are those businesses operating alternative consumption models, while not necessarily having mission values of sustainability. Reflecting on this visualisation of the field of practice made apparent the division that point of sale has in the field, dividing responsibility for sustainability between producers and consumers. Possibilities for the blending of methods also surfaced.

### 3.5.3 OBJECT ANALYSIS

A comparison of different garments drew out the implications for garment design and construction of the survey findings and suggested new possibilities for existing methods re-purposed for sustainability. Garments were photographed and documented in text which was shared informally through a blog that recorded the early phase of the research, and one activity of garment analysis was documented formally through the publication of a conference paper.<sup>307</sup> Garment analysis was also undertaken as part of the documentation of the re-modelling and replication investigations (discussed further below). Analysis identified suitable garments for the investigations, directed the design intervention conducted in response to the particulars of the garment, and then illuminated both intentional and unintentional outcomes. While garment analysis drew out knowledge embodied within the garment artefacts, it also made visible potential mechanisms for scripting use through design, aligning with theories of design for behaviour change that has emerged from the literature review. Wide seam allowances in trousers suggest alteration, underarm shields in a dress indicate the garment will withstand long-term wear. These exercises in garment analysis indicated unrealised potential for methods of design and construction to inform habits of wear and care.

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307. Jo Cramer, "The Living Wardrobe: a redirective fashion practice" (10th European Academy of Design Conference - Crafting the Future, Gothenberg, Sweden, European Academy of Design, 2013).

### 3.5.4 CONSUMER SURVEY

To supplement the limited information retrieved through the contextual review, a survey of both qualitative and quantitative data about the attitudes and behaviours of fashion consumers was conducted. Using a snowball technique disseminated through personal and professional networks globally, 160 anonymous participants were recruited.<sup>308</sup> The survey was administered online, through Survey Monkey.<sup>309</sup> The data were reviewed using Microsoft Excel to sort and filter responses the open-ended questions. The majority of respondents were from Australia (90%). Respondents identified as 76% female, 24% male, 68% identified as being between 25-44 years of age, 66% were in full time employment and 71% had a bachelor's degree or higher. This demographic breakdown is appropriate to the context of the research study being a womenswear wardrobe at an independent designer market level.<sup>310</sup> However, it is also identified as a limitation of the study and further research in different class/cultural demographics may offer significantly different results than those reported here.

Participants detailed garments that had been in their wardrobe for some time, sharing insights into what garment characteristics might enable long-term wear. The survey highlighted the importance of fit and comfort over notions of changing fashions. The survey outcomes suggested two possibilities for design that informed the second phase of the research project: design for evolving engagement such that garments can be adapted to keep pace with the changing needs of the wearer, and design for subsequent lifetimes of those that cannot. This approach was supported by further findings of the survey that indicated just over half the respondents could sew with some competency and that while many of those who could not sew, do not want to learn, many others say they do. These data also show that there is scope to extend existing practices and to introduce new ones to people that already have a pre-disposition to the cause. The survey is discussed in detail below.

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308. Also called a chain-referral sampling method. Initial participants are requested to recruit further participants through their personal networks.

309. "Survey Monkey," accessed January 26, 2019, <https://www.surveymonkey.com/>.

310. Rissanen describes an "independent designer label", as being characterised by "a small team, a high level of control over aspects of design and manufacture, and the designer's ability to juggle many different skills." Within the ready-to-wear market, independent designer labels sit between "luxury super brands, mid-level brands and designers" and "casual wear and sportswear brands, high street, and supermarkets." Timo Rissanen, "Zero-waste fashion design: a study at the intersection of cloth, fashion design and pattern cutting" (Doctor of Philosophy – Design PhD, University of Technology 2013), <http://hdl.handle.net/10453/23384>. p.167

### 3.6 SURVEY OF CONSUMER PRACTICES IN AUSTRALIA

*Survey question:*

*What is it about this garment that makes you keep wearing it?*

*Response:*

*"I love its uniqueness...I love that it captures the feel of another time in a really modern way. It's subtle enough not to get sick of it. More practically, the waistband means that I have been able to still wear it comfortably even though my own waist has expanded a little." (a ten-year-old skirt)*

Concurrently to the Research For Design phase of the study, I conducted a survey of consumer clothing practices in Australia.<sup>311</sup> This was necessary to supplement the little information available on consumer clothing practices at the commencement of this study.<sup>312</sup> The survey collected responses on a wide range of aspects including shopping habits, clothing maintenance practices and extended garment ownership. The focus of the study was to investigate what connections between garment characteristics and lifetimes exist that might prove helpful to design garments for enduring use. Fletcher's early publications on garment lifetimes<sup>313</sup> provides useful detail on clothing use practices, but little on the garment characteristics that give rise to those practices. For example, what is it about a particular dress that enables it to be shared amongst siblings? Do garment qualities (fabric, construction methods, style) enable practices of extended use? Are extended use practices hindered by garment qualities?

There were three parts to the survey: demographic and psychographic information to contextualise the responses given about clothing practices, followed by a section on sewing competency to determine whether participants have the skills to mend and alter clothing and if not, whether they have the inclination to learn. The final part was a series of questions that asked respondents to reflect on two enduring garments within their wardrobe: one being currently worn and the other no longer being worn.

The survey comprised a combination of multiple choice and open-ended questions. To guard against ill-fitting responses being necessarily selected, respondents had the opportunity to give a short text answer within the multiple-choice responses provided to some questions. A copy of the questionnaire and summary of results is provided in Appendix 4. In addition to demographic details, participants were asked about their attitudes to fashion trends. 44% of respondents indicated they had an

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311. HREC ethics approval: B-2000571-09/11, See Appendix 3

312. For a discussion of available data on clothing lifecycle assessment at the time, see Chapman, *Mistra Future Fashion – Review of Life Cycle Assessments of Clothing*.

313. Kate Fletcher, "Lifetimes," 2004, <http://www.katefletcher.com/lifetimes/>; Kate Fletcher, "Local Wisdom," 2012, accessed September 15, 2012, <http://localwisdom.info/>; Becky Earley and Kate Fletcher, "5 Ways," 2003, accessed 6 June, 2018, <http://katefletcher.com/projects/5-ways/>.

awareness of fashion trends and created their own take on them, 35% were interested fashion, but not fashion trends, and felt they had their own style, 16% agreed they did not follow fashion, buying clothes when their current ones wore out. Only 2% agreed that they follow fashion trends and frequently update their wardrobe. This breakdown of results supports the literature discussed in Chapter 2. Individuals bring their own interpretation to fashion through the assemblage of garments into fashionable outfits. Rarely are these outfits entirely new, instead comprise new garments in combination with those already owned.<sup>314</sup>

A number of authors have noted there is a general decline among consumer in the skills required undertake clothing repairs.<sup>315</sup> Further studies indicate this lack of skill is a barrier to enabling clothing longevity through consumer repair of clothing.<sup>316</sup> When asked whether they repair and/or make clothes, just over half the respondents to the survey indicated they could sew with some competency (53%), just under half of the respondents indicated that they wished they could make clothes, and that they would one day like to learn (48%), while just over half (52%) indicated that there were unlikely to ever learn. This result suggests that it is beneficial to develop a system whereby the enthusiastic but inexperienced might be encouraged to attempt repair or re-making. This data also shows that there is scope to extend existing practices and to introduce new ones to people that already have a pre-disposition to the cause. In consideration that some wearers will not engage with practices of repair and re-modelling, design for subsequent use by new wearers should be addressed.

Insights into garment characteristics that may enable or hinder clothing longevity were collected by asking respondents a single set of questions for two garments owned. The first time the questions were asked they were prefaced with, "Describe a garment you have kept for a long time and still wear." The second time the questions were posed, they began with "Describe a garment you still keep, but no longer wear." Asking the same questions of the two garments sought to return comparable responses that would draw out garment characteristics that may enable or prevent long-term wear. No definition of a 'long time' was given, respondents qualified it with an estimation of how many years they have owned the garments. Garment lifetimes ranged between 12 months and 25 years across all types of garments for both those garments worn and no longer worn. From this data, no conclusive findings on garment lifetimes or wearers' perceptions of garment longevity could be made.<sup>317</sup>

Research published by SIFO has shown that in most cases, it is functional reasons (fit, comfort, performance) that determine whether clothing continues to be worn for an extended period, less so changing fashion trends.<sup>318</sup> This was generally supported by the findings of my survey, across all

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314. Woodward, "Accidentally Sustainable? Ethnographic approaches to clothing practices."

315. Fletcher, *Sustainable fashion and textiles: design journeys.*

Alison Gwilt, "What prevents people repairing clothes?: an investigation into community-based approaches to sustainable product service systems for clothing repair," *Making Futures* 3 (2014),

Pamela S. Norum, "Examination of Apparel Maintenance Skills and Practices: Implications for Sustainable Clothing Consumption," *Family and Consumer Sciences Research Journal* 42, no. 2 (2013), <https://doi.org/10.1111/fcsr.12047>

316. Goworek et al., "Consumers' attitudes towards sustainable fashion: Clothing usage and disposal." Langley, Durkacz, and Tanase, *Clothing Longevity and Measuring Active Use.*

317. For a detailed discussion of clothing use and duration, see Laitala and Klepp, "Short Age and active life of clothing."

318. Niinimäki and Hassi, "Emerging design strategies in sustainable production and consumption of textiles and clothing.",

garment types. Additionally, changes in personal identity were also cited: "It's not my style anymore", indicating that the respondent's personal image had evolved since the garment was acquired. This too reflects trends identified in the research published since.<sup>319</sup> This was particularly true of respondents that discussed a dress they have owned for a long time but no longer wear. Taking into account that the majority of the respondents were female, dresses represent the most significant garment category described in response to this question (42 garments),<sup>320</sup> followed by jackets (31 garments). These survey responses are discussed below as a case study of longevity of one clothing type, the dress.

Within the womenswear wardrobe, a dress offers a complete outfit in one garment. Dresses are worn for all occasions and activities: day and evening wear, work and leisure wear, casual and formal occasions. The dresses described by survey respondents indicated that dresses are often adapted for different occasions: a dress worn to work might also be worn to dinner. Dresses purchased for a special occasion were the largest category described in the survey. These are garments that are typically high cost, fashion-forward,<sup>321</sup> and worn infrequently. The reasons cited for no longer wearing a dress are given in Table 3.1, alongside the reasons given for keeping the dress. Many respondents provided two reasons for no longer wearing the dress and some provided two (or more) reasons for keeping it. After Laitala and colleagues,<sup>322</sup> these have been broadly categorised as wear and tear; fit or size; fashion, taste or boredom; and other reasons. Under the headings 'reasons no longer worn' and 'reasons to keep', table 3.1 lists these reasons with the corresponding number of times each reason was given as the primary and secondary reason. For example, changes in personal taste was cited 12 times as the main reason to no longer wear a dress, and 3 times as a secondary reason.

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Klepp and Laitala, "Consumption Studies: The force of the ordinary".

319. Klepp and Laitala, "Consumption Studies: The force of the ordinary".

320. Six of the dresses described were wedding dresses. Because of the deeply sentimental nature of wedding dresses and the traditions surrounding them, these were excluded from further consideration in the research. Western wedding traditions dictate that the dress be kept as a memento of marriage and passed down as an heirloom. While they are kept and treasured, wedding dresses are not actively worn and to include them in the data analysis skews the results.

321. Within a seasonal fashion collection, dresses are often the highlight styles and embody the most up-to-the-minute take on the current trend. Therefore, they can date quickly.

322. Laitala, "Consumers' clothing disposal behaviour – a synthesis of research results."

Reasons no longer worn (primary/secondary)	Reasons to keep (primary/secondary)
fashion, taste or boredom	sentimental (10/3)
personal taste change (12/3)	appealing garment qualities (8/4)
fashion change (5/0)	possibility to wear again (occasion, fashion taste change) (5/3)
fit or size	intention to/awaiting repair/re-make (4/1)
fit- unspecified (6/1)	hope to change self-perception (1/0)
fit- too small (3/2)	hope to fit (2/0)
wear and tear	cost/guilt (1/3)
condition (1/2)	fondness (2/1)
other reasons	
comfort (unspecified physical and/or psychological) (3/0)	
no occasion (formal wear) (4/3)	
other- nothing to wear with it (1/0)	
care (difficult) (1/0)	

TABLE 3.1. SUMMARY OF SURVEY RESPONSES THAT CITED A DRESS IN RESPONSE TO THE QUESTION "DESCRIBE A GARMENT YOU HAVE OWNED FOR A LONG TIME, STILL KEEP, BUT NO LONGER WEAR." <sup>323</sup>

Survey respondents cited changes in personal taste, but also that the style of the dress no longer matched the prevalent look (fashion change), "it is too old fashioned padded shoulders etc." In some cases, the garment style was no longer considered flattering, often because changes to the body shape that meant, for example, a short skirt was no longer perceived to look good or because advancing age rendered the garment no longer suitable. As one respondent said of her dress, "I think it doesn't suit me, I don't feel right in it." Where fit was cited as a reason to no longer wear the garment, it was largely defined as the garment being too small for the maturing female body. "It may have been fashionable at the time, but has the appearance of being too dated and because it is quite fitted, it no longer suits my body shape." While personal taste, fashion trends and the physical body change over time, the garment does not. This means that perfectly serviceable garments fall into disuse, stored within the wardrobe in a state Klepp defines as being "at mercy" before discard (see Chapter 2).<sup>324</sup>

Survey respondents described a mix of reasons for keeping the dress they were not wearing: some gave sentimental reasons associated with the occasion for which the dress was purchased, "my 21st birthday dress", some commented on the fabric, style, or details of the dress, "I like it as a thing. It's really well made from a lovely fabric and has a nice silk lining and nice buttons. Or perhaps I'm just in denial that I'm too old to wear it!" The hope of wearing the garment again was present in several responses "[I keep it] because one day I or it may change. It cost too much to throw out. I'm a hopeless optimist." These responses support the findings of an earlier study by Bye and McKinney

323. Excluding wedding dresses

324. Klepp, *Why Are Clothes No Longer Used? Clothes Disposal in Relationship to Women's clothing habits*.



who found four general themes why women kept clothing that did not fit: Weight Management, Investment Value, Sentimental Value, and Aesthetic Object.<sup>325</sup>

While some respondents intended to repair or re-make their dress, only one survey respondent indicated that changing how she incorporated the dress into an outfit might be a way to reintroduce it back into regular use. She said of a printed, silk chiffon, special occasion dress, “[I keep it] in the belief that I may possibly still be able to wear it by dressing it down and therefore changing its appearance somewhat.” Where separates like skirts and tops are easily matched with new garments to maintain a currently fashionable look, a dress is not so easily updated. Nor does a dress easily accommodate changes in body shape, whereas different sized tops and skirts might be worn on the upper and lower body. A dress is a particularly inflexible garment type, offering one look and fit over time.

In contrast, dresses that were still worn, were worn because they were unique, classic, and still fit comfortably. Of the garments that respondents discussed when asked to describe a garment they have owned for a long time and still wear, 31 were dresses. Many respondents provided three reasons they continue to wear the garment. Table 3.2 lists the reasons given and quantifies each with the number of times it was given as the primary, secondary and tertiary reason for continuing to wear the garment (shown in brackets).

Reasons still worn (primary/secondary/tertiary)

Classic/timeless style (5/3/0)	TABLE 3.2. SUMMARY OF SURVEY ANSWERS CITING A DRESS IN RESPONSE TO THE QUESTION “DESCRIBE A GARMENT YOU HAVE OWNED FOR A LONG TIME AND STILL WEAR.”
Comfortable (3/2/0)	
Easy care (0/1/0)	
Feels good (2/1/2)	
Fit (1/2/3)	
Quality make (1/2/2)	
Versatility (1/1/1)	
Visual appeal (3/3/2)	
Unique (3/0/1)	
Sentimental (1/0/0)	

With no directly comparable research available, the descriptors for respondent’s motivations are drawn from their responses. ‘Classic’, ‘timeless’ and ‘dateless’ were terms used repeatedly to describe garment styles that transcend time, “...for me [it] is dateless. It is a vintage garment (circa late 60s, early 70s), and although it reads as being from that time it also works in a contemporary context.”

325. Elizabeth Bye and Ellen McKinney, "Sizing up the Wardrobe—Why We Keep Clothes That Do Not Fit," *Fashion Theory* 11, no. 4 (2007/12/01 2007), <https://doi.org/10.2752/175174107X250262>

Related to this were responses that noted the uniqueness of the garment's style, "It has a very unique cut and shape and I have never seen it on anyone else." Or identified a particular visual quality of the garment, "It's elegant and the colour is timeless." Where comfort was cited, it was not always defined, "It is comfortable, classic, simple, but always looks nice." Comfort can be either physical or psychological and no assumptions were made about the respondents' intentions where it was not clear. Other respondents were more specific citing 'fit' and 'feeling good' in a garment, "It is my favourite dress as it fits me perfectly and I feel very comfortable in it." Only one respondent noted a sentimental reason for wearing the garment, that her husband liked it.

In contrast to the reasons provided for no longer wearing a dress, the reasons cited for continuing to wear one are similar. In summary, the dress styles have maintained appeal by transcending fleeting fashion fads. Further, they have enabled long-term wear through physical affordances of flexibility in fit and versatility in ways the dresses can be assembled into a contemporary outfit. This results in the wearer feeling good in the garment, with half still wearing it as often as when they had bought it (51%).<sup>326</sup>

The findings of the survey extend on the literature available at the time by making explicit connections between specific garment characteristics and habits of wear. Functional shortcomings prevent extended wear, but emotional attachment means they are kept and often there is an intention to wear the garment again. This knowledge provides some direction to design to develop garment styles that are adaptable to the changing need of wearers over time, or that can be renewed at the stage they are 'at mercy'<sup>327</sup> of discard, to return them to use. In addition, the complex nature of the personal relationship people have with clothing revealed through the multiple responses to some questions, further suggests that sustain-able garments need to be designed and manufactured with methods that open the garment to many future possibilities for re-making and that consideration should be given to the skill level of the wearer in making repairs and modifications, since ability and inclination varies.

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326. 41% wore it less often and 8% wore it more. For those that wore it less often, responses indicated that newer garments compete with these enduring pieces.

327. Klepp, *Why Are Clothes No Longer Used? Clothes Disposal in Relationship to Women's clothing habits*.

### 3.7 RESEARCH THROUGH DESIGN

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The cyclical nature of the action research methodology that frames this study enables concurrent trajectories of investigation. During research for design activities, reflection can often suggest further research activities to be actioned through practice. Phase Two of the research is one of experimentation in practice, of research through design. In *Practice Based Design Research*, Laurene Vaughan explains research through design is: "to use the actions and sites of practice as a means of discovering something to be useful in articulating the intentions and outcomes of a practitioner-researcher's inquiry."<sup>328</sup> In this study, design practice is undertaken as a method of research to extend on the findings of Research For Design and the existing knowledge within my own practice. It also makes manifest the embodied knowledge of the research, "Research through designing uses the knowing of doing to achieve productive outcomes which in turn indicate the knowing and knowledge used in their production."<sup>329</sup>

While the Research Through Design investigations were iterative, overlapping and at times intertwined, they are described here in two parts to facilitate a clear narrative within the thesis. The first part comprises experimentation to expand the repertoire of the research, the second part describes a series of original garment prototypes that explore potential methods and outcomes of a fashion practice redirected for sustain-ability.<sup>330</sup>

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#### 3.7.1 REPERTOIRE BUILDING RESEARCH

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Repertoire building research has expanded on and enriched the findings of the literature review, by testing key ideas through fashion design practice. Schön explains repertoire building research as gathering and analysing precedents (case studies) to inform reflection-in-action in new situations.<sup>331</sup> This is a natural part of the design research process in fashion, where historical garments are referenced usually through images, although where possible the physical artefacts may be examined. The work of other contemporary designers might be examined in the same way. Schön points out that repertoire building research tends to focus on the action, outcome, and context of the case being studied and reveals less about the method of inquiry.<sup>332</sup> However this research contends that greater insight can be achieved through repertoire building practice research, in which precedents are not only reviewed through the examination of documentation but experienced through practice. This perspective informed a series of design experiments in which a number of historical and contemporary methods of garment design were 'tried on for size'. Selected in response to the findings of the contextual review, these methods explore the potential of existing design strategies within fashion and design to

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328. Laurene Vaughan, *Practice Based Design Research* (London: London, GB: Bloomsbury Publishing Plc, 2017)., p.10

329. Downton, *Design Research*., p.107

330. Sustain-ability is defined in Chapter 2.

331. Schön, *The reflective practitioner: how professionals think in action*., p.315

332. Schön, *The reflective practitioner: how professionals think in action*.,p.317

contribute to sustain-ability in garment use. However, these action-based exercises resulted in the discovery of possibilities for new methods of fashion design for sustainability. The investigations undertaken are grouped under three main themes: Existing Garment Production, Scripting and Replication.

### 3.7.2 RESEARCH THROUGH FASHION DESIGN PRACTICE

The suite of design investigations that comprise the second part of the Research Through Design phase are activities of research through fashion design practice. It is through these activities that new ideas and understandings gleaned from the first phase of research for design are experienced within existing practice, exploring their potential to redirect practice for sustain-ability. Practice as a method of research extends beyond the application of new knowledge to existing practice to be a site of new knowledge generation. The findings of this thesis were realised through the practice investigations described in Chapters 4 and 5 and outlined below.

#### 3.7.2.1 GARMENT PROTOTYPES

From the design strategies that had emerged from the repertoire building research investigations into the possibilities of 're-conceptualising existing, past and forgotten technologies' in fashion design for sustain-ability,<sup>333</sup> a series of prototype garments was proposed to test how these approaches might be incorporated into new designs. The development of the garment designs was further informed by the findings of the survey, which provided insights into garment failings that might be addressed at the design stage, particularly the reinforcement of areas of likely wear and the provision for alteration to accommodate changing fit. The series of garments was not developed concurrently as a collection, rather the designs were developed iteratively, with each informing the next. Through the development of the series, the appropriateness of the emerging design strategies for sustain-ability was tested across different garment types made from different fabrics. The garment types selected represent the basics of a womenswear wardrobe: dress, skirt, coat, knit top and pants. A pair of culottes extended on the development of the skirt.

#### 3.7.2.2 WEBSITE OF RESOURCES TO ACCOMPANY THE GARMENTS

The garment prototypes revealed considerations that could not be resolved through garment design alone: principally how the enduring capacities of the garments might be accessed and utilised. As these concerns emerged, they were addressed as practical problems to be solved through further experimentation. Moving away from garment design, a website of resources for enabling wearer interaction with the garment offers a potential solution to the challenge that wearers may have limited

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333. Fry, *Design futuring: sustainability, ethics, and new practice*.

garment literacy to read the futuring capacities or the know-how to act on those capacities. A website has the further potential to support a peer community around changing practices by providing a forum to which participants can contribute.

### 3.7.2.3 EMBROIDERED QR CODE LABELS TO LINK THE GARMENTS TO THE WEBSITE

While some of the capacities that enable extended use of the garment prototypes developed in this research are self-evident (wide seam allowances), others require explanation and instruction, or risk being overlooked (that components are designed to be replaced). The garments need to speak their qualities to whoever wears them at the time they need attention. Typically, garment labels are used to communicate information about a garment to the wearer (care instructions, size, brand name). Because it is beyond the capacity of a label stitched into the garment to describe all its enduring attributes, instead a label might reference where that information can be found, suggesting to the wearer that there is more to the garment than is first apparent.

In this project, the potential of a Quick Response (QR) code is explored to serve this function. A QR code is useful in the context of this project for a number of reasons. It is simply generated through free software without any great technical knowhow. Similarly, it can be read by a smart phone camera, again using free software. The software displays the information contained and actions the embedded content. QR codes are often printed, but here are being developed as embroideries for increased durability. In this case, the QR code redirects to the website where there is a suite of resources to support each garment: instructions for care, repair and re-making, specific to the garment scanned. It is proposed that engagement with the resources can be encouraged through provision of blog like facilities that allow the upload of photos and comments from wearers of the garments who may have made changes by following, adapting or subverting the resources provided. The permanent QR code label in the garment makes these resources available to subsequent owners who need only be curious enough to scan the code.

### 3.7.2.4 DOCUMENTATION

Journaling of the design process through folio and blog reflections, notes, photographs, patterns, toiles, and garment specifications document the progression of this research study. Such documentation is typical of a conventional fashion design process for which a folio of research into the upcoming season's concept (inclusive of colours and fabrics) and design sketches accompanies new garment samples in development (patterns and toiles). This documentation preserves the chronology of the study, enabling reflection *-in* and *-on* -action<sup>334</sup> to inform new cycles of action research.

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334. Schön, *The reflective practitioner: how professionals think in action*.

### 3.7.3 RESEARCH THROUGH EXISTING GARMENT PRODUCTION PRACTICES

The long history of domestic clothing production suggests many possibilities for practitioners seeking to re-orient their practice for sustain-ability. In *Design Futuring*, Fry notes that the advanced technological fix is not necessarily the only solution to the challenges of sustain-ability and suggests that, "there is great deal of design potential in re-conceptualising existing, past and forgotten technologies."<sup>335</sup> In response, the question that framed these investigations was, "What are the existing methods available to fashion design with the potential to extend the currency of fashion garments in use?" The aim being to explore historical methods of garment design and construction with the potential capacity to change both the fit and look of the garment built into their design. The result of the consumer survey (see earlier in this chapter) indicated that a combination of both these qualities (the garment's suitability to the changing body and its relevance to changing tastes, both personal and societal) is essential to keeping a garment in use. The investigations were undertaken with consideration of whether the same design strategies might address both concerns or possibly require a combination of approaches.

#### 3.7.3.1 RESEARCH THROUGH EXISTING GARMENT PRODUCTION PRACTICES: TEXTS

The precedent for the review of historical dressmaking texts is Rissanen's chapter, "Designing Endurance", in the volume he edited with Gwilt, *Shaping Sustainable Fashion: changing the way we make and use clothes*.<sup>336</sup> In this chapter, Rissanen discusses a number of practical design strategies in support of extended garment use, with a focus on zero-waste cutting. Rissanen cites examples of early twentieth century clothing construction manuals in support of his argument that many of the methods associated with contemporary design practices for sustainability in fashion have existed for some time, even centuries. The survey of texts carried out for this study expand on the findings of Rissanen by locating further existing methods of garment design and construction that might be recontextualised for fashion design for sustainability.

A survey of the more popular references for dressmaking in the twentieth century reveals that these texts fall into two categories, instructional texts for tailors and dressmakers, and homemaker manuals.<sup>337</sup> To the benefit of this research, the former provide insight into garment design and construction methods with provision for future alteration while the latter contain greater detail on repair and re-modelling. These texts transport the reader to a time of frugal consumption when fabrics are precious resources (particularly in those texts immediately following the rationing of World War II<sup>338</sup>) and garments are valuable possessions that warrant careful, skilled maintenance. The possibilities for

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335. Fry, *Design futuring: sustainability, ethics, and new practice*, p.77

336. Timo Rissanen, "Designing Endurance," in *Shaping Sustainable Fashion: Changing the Way We Make and Use Clothes*, ed. Alison Gwilt and Timo Rissanen (Taylor and Francis, 2012).

337. See Appendix 5 for a list of texts reviewed.

338. see for example National Archives, *Make do and mend: keeping family and home afloat on war rations : reproductions of official Second World War instruction leaflets* (Great Britain: Michael O'Mara Books Ltd., 2007).

extending the active life of clothing are described in a cheerful tone that implies thriftiness is a virtue and not merely borne of necessity.

One book reviewed is an especially rich resource of methods and approaches to extending the life of a garment, entitled: *Practical Home Mending Made Easy*, published in 1946, which encourages the reader to “mend for pleasure and economy.”<sup>339</sup> This book covers an extensive range of approaches to garment care, mending, making and re-making clothing to ensure maximum lifespan. Strategies include: minimal waste cutting, re-fashioning clothes by replacing worn or out-dated components, recutting new clothes from old, adjustments for size variations, correcting fit through the clever addition or subtraction of fabric, reinforcing areas of potential wear, concealing damage with embellishments and down-cycling worn out garments to other household purposes.<sup>340</sup> As a manual of dressmaking techniques written for the novice seeking new skills in mending, there are many aspects of the book that might be recontextualised as a handbook for practicing sustain-able fashion. Many of the lessons are valid for modern clothing, and so too is the book’s format, written as the title proclaims, to be both practical and easy. Although some of the techniques are no longer commonplace (dress shields in blouses), they persist within the recall of older generations, and in the manufacture of very high-quality garments. They are methods that can be employed within existing industrial production processes and within contemporary domestic environments. The chapters titled “Let’s Refashion It”, “Cut Your Coat to Fit Your Cloth”, “Was Tom’s-Now Judy’s”, “Save That Coat” and “One Yard of Fabric to Make A Dress” (Figure 3.7) provide an historical context for the review of contemporary sustainable fashion practices as well as guidance in the approaches adopted for the re-modelling investigations. These are described later in this chapter.

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339. Mary Brooks-Picken, *Practical Home Mending Made Easy* (Watford, Great Britain: Odhams Press Ltd., 1946), p.1

340. Brooks-Picken, *Practical Home Mending Made Easy*.



## ONE YARD OF FABRIC—TO MAKE A DRESS

*"I want a piece of calico  
To make my doll a dress  
It doesn't take a big piece,  
A yard will do, I guess."*

THIS VERY OLD little jingle is here to inspire your imagination to work with remnants and scraps of material and to realize that much can be accomplished even with one yard more or less of fabric.

Fabric can extend itself to your requirements if you plan wisely. Never discard a good piece of fabric. Re-use old garments: rip, clean, press, re-cut and re-sew with enthusiasm and skill to insure smartness. There are many ways to use even small pieces of fabric—as yokes, cuffs, inserts in sleeves, collars and trimming pieces. Look at your worn dresses; see what is needed to make them serviceable and fashion-right again. Then choose the suggestions given here that are appropriate to your own dresses, and replace the old fabric with new—smartly and easily.

You will notice that short sleeves are shown in many of the remodelled ensembles suggested in this book. This is done to effect economy in material. If fashion insists upon long sleeves, remember that you can make them of new fabric, or make deep cuffs of new fabric to add to the sleeves. You can also insert new parts in sleeve sections so that your sleeves may be made whatever length you desire.

A. This old dress, shabby in front and at the neck—was made like new with a yard of new material. If you have such a dress, buy a yard of velveteen, crepe, flannel—any fabric that goes with the dress fabric. If the dress is worn and out of fashion, rip, clean and re-cut it. Make a new front and collar. Use the old front parts and the old sleeves to make two-piece sleeves; or, if the sleeves are good and the back is worn, cut a new back from the old front, and retain the original sleeves.

B. Here is a dress that had its lower blouse section completely remade. Many business girls wear their dresses out first around the waist. In such a case, cut away the worn part and add a new section. Usually ½ yd. of 40-in. fabric is enough to give a whole new middle part to a dress, and sometimes this seems to make a drab dress new and gay. Freshen up all the old parts to make

a new yoke or collar, or perhaps to piece the sleeves if they need renewing.

C. If the skirt of your old dress is good, cut away all the worn blouse parts and add new material. In the illustration, a new front and new back were added, and the good parts of the original back and front were used for new sleeves.

D. Often a collar is the first part of a dress to lose its fashion-rightness. In such a case, don't hesitate to cut away the out-of-fashion collar and apply one that is more appropriate or style-right. In this dress, the collar and front needed refurbishing, so a new collar and a vest portion were added. You could easily place a similar centre panel down the back if it were needed, extending it to the same depth as the front, or making it a little shorter or continuing it all the way to the waistline.

E. This shows a new two-piece costume with a simulated vest, made from an old dress having a worn blouse front. The vest part was fashioned of new material and stitched in place to make the waistline completely new.

F. If you want to rejuvenate a dress of a light colour—possibly too light for general wear—buy some dark material that is right in texture for your dress. Add a section of the dark colour to the top of the skirt, make a new belt, and add new fabric to the sleeves—and thus treat yourself to a new dress that you can wear all the year round. If the front opening in your old dress is good keep it as it is, but make a new one if it will make the dress seem newer to you. You can do this by adding a front facing of the new fabric, or by inserting an entirely new front with a pleat or a zipper fastening.

G. Here is another way of refurbishing a dress. This soft gilet is usually flattering and is very easy to make. If you buy half a yard of lace for re-styling a dress in this manner, you can cut the original sleeves either short or three-quarter length or make new loose sleeves as desired.

H and I. These illustrate a happy way to

rejuvenate the top of a dress or blouse. It is particularly appropriate for frocks of velveteen or jerseys. Use rayon or wool to cut a new yoke and new sleeves. Have buttons covered with the new fabric, or use any fashionable, appropriate type of button or a zipper for the front closing. Make a smart, new collar. Cut your sleeves so that they are "comfy."

J. This is a very practical and satisfactory dress, remodelled from an old button-down-the-front frock. If you have such a dress, a wool dress, especially, with sagging buttonholes and missing buttons, buy a yard of fabric and cut a new front that goes from neck to hemline. Do your piecing with a seam at the waistline and use a smart belt to cover it. Line the upper part of the front panel and sew snap fasteners along the edges. Add cuffs of the new fabric to finish the sleeves or make entirely new sleeves. This is a convenient way to refurbish when fashion allows and makes an especially practical garment for a young mother, though it is not exclusively a maternity style. If a new collar is to be made, cut it from the old material that was removed from the front, and, if you wish, cover it with the new.

Remember always that the purpose of these pages is to give you an idea. The silhouette of your garment may be different but the idea applicable to your needs. Study these pictures and see in what way you can add to what you have to eliminate the worn, shabby or out-of-fashion part without a patched or overdone appearance.



FIGURE 3.7. "ONE YARD OF FABRIC - TO MAKE A DRESS" IN BROOKS-PICKEN, *PRACTICAL HOME MENDING MADE EASY*

### 3.7.3.2 RESEARCH THROUGH EXISTING GARMENT PRODUCTION PRACTICES: GARMENTS

While some of the tailoring techniques detailed in these chapters were known to me prior to this study, the survey of historical texts expanded my knowledge to further methods, suggesting new possibilities for garment design for sustain-ability. Traditionally tailored garments are durably constructed to enable future alterations, with anticipated areas of wear reinforced. While the historical references outlined above described these approaches in-depth, a subsequent analysis of a number of existing garments brought to life the techniques described. For this investigation, a range of men's tailored and casual trousers was sourced from a charity shop.<sup>341</sup> The garments were selected for their use (and variation in use) of the techniques described in the historical texts reviewed. The garments were documented visually before some pieces were deconstructed and reconstructed to experience the mechanisms for alteration provided.

341. My local Rotary store, an old-fashioned suburban charity shop in Flemington, an inner-city suburb of Melbourne, stocks an eclectic array of the neighbourhood's cast-off clothing and bric-a-brac.



This cycle of practice investigations enriched the findings of the survey of historical texts by providing physical examples of the methods described in the books. Further, the garments sourced were worn garments, some of them clearly decades old, therefore some analysis of the effectiveness of the reinforcements or alterations could be made. Together, the selection of trousers indicated the differences in tailoring methods employed between garment types (casual chinos, suit pants), and between brands (particularly through the different applications of heel tapes in the suit pants). These findings contributed to developing suite of garment design and construction techniques to be reintroduced into contemporary womenswear, complementing the findings of the re-modelling investigations (Chapter 3).

### 3.7.3.3 SCRIPTING AS A METHOD: EXPLORED THROUGH AN ANALYSIS OF TWO PAIRS OF TROUSERS

In addition to the richness of historical methods of garment design and construction, scripting had emerged through the contextual review as a method of design for behaviour change.<sup>342</sup> A comparative analysis of two pairs of trousers examined the concept of scripting through fashion garments and suggested the potential for scripts to activate the garment artefact as an enabler of sustain-able clothing use practices.

The review of men's tailored pants found that tailoring methods that support long-term use, (by including provisions for alterations and reinforcements of areas of wear) are not only found in high quality, formal garments, but are used also in contemporary casual trousers typical of the mass market. However, the same features are generally not found in comparable womenswear trousers, as the below garment analysis exercise describes. The two photographs in Figures 3.8 and 3.9 show two common construction components used in men's suit trousers at nearly all levels of the market: a deep centre back seam allowance to facilitate fluctuations in waist measurement and a seat shield to protect the crotch seam intersection from wear caused by friction and sweat.

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342. Fry, *Design futuring: sustainability, ethics, and new practice*; Jelsma, "Designing 'moralized' products."; McKenzie-Mohr, *Fostering sustainable behavior ; an introduction to community-based social marketing*; Abbey Mellick Lopes and Alison Gill, "Reorienting sustainable design: practice theory and aspirational conceptions of use," *Journal of Design Research* 13, no. 3 (2015), <https://doi.org/http://dx.doi.org/10.1504/JDR.2015.071456>



FIGURE 3.8. CONTEMPORARY MEN'S TROUSERS WITH WIDE BACK SEAM TO FACILITATE ALTERATIONS.



FIGURE 3.9. CONTEMPORARY MEN'S TROUSERS WITH GENEROUS SEAT SHIELD TO PROTECT AGAINST WEAR.

Typical, mass-market suit trousers such as these might be worn almost daily to work until they wear out.<sup>343</sup> They are performative but also symbolic in function, assimilating the wearer into the office environment in which they are worn. Office dress codes for men change slowly,<sup>344</sup> thus the trousers have a long-life expectancy and as such are durably made.



FIGURE 3.10. CONTEMPORARY WOMEN'S TROUSERS SHOWING BORROWED CONSTRUCTION ELEMENTS FROM MENSWEAR.



FIGURE 3.11. CONTEMPORARY WOMEN'S TROUSERS SHOWING WITH CENTRE BACK SEAM THAT CANNOT BE LET OUT. THE SEAT IS NOT SHIELDED AGAINST WEAR.

The fabric comprises wool blended with polyamide for feel, strength and wrinkle resistance, areas of potential wear are shielded (the seat in this case though sometimes also the thighs and knees), part lining contributes stability and comfort and facility for alteration in waist size is provided. Contrasted

343. These trousers have been discarded following a substantial tear to the knee.

344 Katam Al-Falou, "A new model for participation and sustainability in fashion design" (Doctoral Thesis, Technische Universität Berlin, 2017).

against a pair of typical mass-market women's work trousers (Figures 3.10 and 3.11), the difference in design intention becomes apparent. While aspects of men's tailoring have been borrowed for a neat interior finish (extended fly, binding to finish edges), the same design for durability features are lacking. Despite the conservative straight leg cut and office-appropriate grey wool fabric, long-term wear is not considered in the construction of the trousers: no alterations are allowed for and areas of wear are not protected. As well as prohibiting changes that wearers may need to make to the trousers over time, by not providing mechanisms for alterations in women's trousers, the garment communicates that women's trousers are not to be altered, instead discarded and replaced.

The capacity for artefacts to steer their use in particular ways is known as scripting.<sup>345</sup> Scripting describes the way in which an artefact can encourage users to adopt specific behaviours by enabling some actions while constraining others.<sup>346</sup> In the example of the women's trousers above, the possibilities for alteration are constrained by the construction methods used, which steers the wearer to replace rather than alter the trousers when they no longer fit. Instead, had the women's trousers been designed and constructed using methods that facilitate future re-modelling, then those components by virtue of being visible within the garment, might well prompt the decision to alter in preference to discard. Importantly, scripting presents a means for both the garment and the wearer to share responsibility for sustain-ability: the garment in need of repair has the capacity to be repaired and thus suggests to the wearer to repair it.

However, Jelsma makes the point that while scripting offers means of directing behaviour, it cannot explicitly dictate that behaviour and it must be acknowledged that users will find a way around the script if they want to.<sup>347</sup> In the context of clothing-fashion, this means that garments with provision for alterations may not be altered when they no longer fit. It may be that the wearer does not have the required garment literacy to recognise that deep seam allowances afford alteration (and therefore they are unlikely to possess the skill to make the alteration) or it may be more convenient to discard and replace the garment. Thus, garments may be scripted with the potential for a long lifetime, but there is no way to ensure those practices are taken up. That garments may fall from favour remains to be addressed. It is unrealistic to expect one person to wear the same garments until they fall apart. Could scripting also encourage sustain-able behaviours of garment discard?

Fry contends that "the agency of design objects [...] is seriously undertheorized by a great deal of the sustainable consumption discourse."<sup>348</sup> This appears to be especially true of the fashion sector, where strategies for sustainable fashion design have focused on product development over practices of use (see Chapter 2). Garment prototypes produced in this study address this by considering how garment mechanisms that facilitate re-modelling, might additionally steer wearers to undertake the actions of

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345. Chapman, *Emotionally durable design: objects, experiences and empathy*; Fuad-Luke, *Design Activism Beautiful Strangeness for a Sustainable World*; Jelsma, "Designing 'moralized' products."

346. Jelsma, "Designing 'moralized' products.", p.223

347. Jelsma, "Designing 'moralized' products.", p.223-224

348. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.193,

See also Ida Nilstad; Boks Pettersen, Casper; Tukker, Arnold, "Framing the role of design in transformation of consumption practices: beyond the designer-product-user triad," *International journal of technology management: IJTM* 63, no. 1, (1.1) (2013), p.98

alteration instead of discard.<sup>349</sup> The types of actions that might be fostered are investigated in a further series of replication exercises, discussed below.

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### 3.7.4 REPLICATION

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Replication has a long history and contemporary relevance to action research and reflective practice. Replication is used in the study as a means to test in practice, the methods of design discovered through the contextual review. These activities reference both historical and contemporary concepts, in keeping with the intent of the research study to re-conceptualise 'existing, past and forgotten technologies.'<sup>350</sup> To explore the practice of sustain-able methods of garment design, replication was approached from two perspectives: the replication of design methods and the replication of design artefacts.

Because of its popularity with both designers and wearers alike, the experience of replicating the methods of contemporary sustainable fashion practitioners focused on re-use as a design strategy for garment longevity. The first garment re-use exercises explored the constraints and allowances of garments for future alterations and provided insights into techniques of garment design for re-modelling. The second replication activity comprised the production of a garment using a pattern and instructions downloaded from the website of a contemporary practitioner that positions themselves as having an ethical practice.<sup>351</sup> This exercise explored an alternative method of the dissemination of clothing-fashion: as styles produced for home manufacture. The experiment highlighted the importance of instructional materials to guide participation in the creation of the clothing-fashion artefact by consumer-makers of varying capabilities.

#### 3.7.4.1 REPLICATION OF METHOD: RE-MODELLING AND RE-MAKING INVESTIGATIONS

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In the preface to *Practical Home Mending Made Easy*, the author describes it as being two books in one: a book on mending and a book on re-making. She encourages her readers to apply the mending skills described in the first part to rejuvenating any garment in the wardrobe, with reference to the lessons in the second part. She writes, "Whether or not you have ever sewn before, if you master the essential stitches, seams and finishes give here, you should be able to mend any type of garment. Then [...] you are ready for another whole book- the pages of refashioning and refurbishing."<sup>352</sup> Skills that maintain garments may also be applied to their re-making to conceal flaws (Figure 3.12) and also to re-

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349. Ted Schatzki, "Practices, governance and sustainability," in *Social Practices, Intervention and Sustainability*, ed. Yolande Strengers and Cecily Maller (United Kingdom: Routledge, 2015), p.23

350. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.77

351. Alessandro DeVito Lika Volkova, "Sans," no. 17/01/2011

352. Brooks-Picken, *Practical Home Mending Made Easy.*, p.vi

purpose garments for new wearers (Figure 3.13). Redirecting skills in this way significantly expands the capabilities of the home sewer beyond repair, to re-design.

The survey of historical texts and garments revealed a wealth of garment design and construction techniques that might be reintroduced into contemporary garment design and manufacture to extend the use of garments. This suggested that garment re-modelling could play a much greater role in fashion design strategies for sustainability if garments were designed for re-use through re-modelling and re-making. A number of practice investigations were developed to explore different approaches to garment re-modelling and re-making, that informed the garment prototypes developed in the second phase of research through design.



FIGURE 3.12. "SAVE THAT COAT" A LESSON ON REPAIRING WORN GARMENTS BY ADDING NEW FABRIC

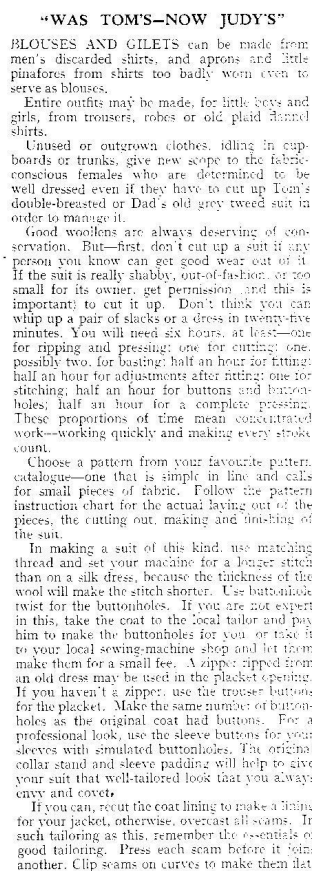


FIGURE 3.13. "WAS TOM'S NOW JUDY'S" A LESSON ON REPURPOSING GARMENTS FOR NEW WEARERS



#### 3.7.4.2 GARMENT ANALYSIS FOR RE-MODELLING AND RE-MAKING

The garments used in the re-modelling and re-making investigations were drawn from my own wardrobe: three skirts and two dresses that I was no longer wearing at the time. Each garment was examined to determine why it was not being worn and what physical affordances it offered for re-modelling to return it to active use. This analysis again employed the criteria for assessment used in the Review of Consumer Practice in Australia survey, after Laitala and colleagues.<sup>353</sup> Each garment was further assessed to determine what possibilities were afforded through its design and fabrication for re-modelling or re-making. This analysis is summarised in Table 3.3 below.

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353. Laitala, "Consumers' clothing disposal behaviour – a synthesis of research results."






	Investigation 1 (skirt 1a)	Investigation 1 (skirt 1b)	Investigation 2	Investigation 3a	Investigation 3b
					
<i>Description</i>	Skirt 1a: a versatile style knee length style that had been worn frequently but was now unevenly faded due to the combination of fabrics, and an iron mark, no longer being worn, awaiting discard.	Skirt 1b: a fashion forward calf length style featuring tessellated panels of wool, seamed together using raw edges on the face of the skirt, that was looking ratty, no longer being worn, awaiting discard.	Skirt 2: a silk velvet mini length wrap skirt that was too small at the waist, no longer being worn, awaiting alteration.	Dress 1: <i>The Bird Dress</i> , which was uncomfortably tight the waist, being worn infrequently.	Dress 2: a 1970s floral sleeveless, unlined, maxi-dress of a-line silhouette, made from polyester knit, not being worn because it rode up on the hips but was loose around the chest.
<i>Reason not worn</i>	wear and tear	wear and tear	fit or size	fit or size	fit or size
<i>Method</i>	disassembly to retrieve the parts that might be re-used	disassembly to retrieve the parts that might be re-used	Enlarge waistline by adding a new fabric piece.	Utilise affordances of the garment's design and construction to facilitate the alterations needed	Utilise affordances of the garment's design and construction to facilitate the alterations needed

TABLE 3.3. SUMMARY OF ANALYSIS OF GARMENTS FOR RE-MODELLING

The methods of re-modelling and re-making selected for each garment were informed by the practice review and review of historical texts and garments undertaken, in conjunction with techniques I was familiar with through my own professional experience of garment making. Three practice investigations were formulated: re-making two skirts into one new skirt ("Let's Refashion It"), re-modelling a skirt by adding new fabric to it ("One Yard of Fabric to Make A Dress"), altering two dresses to improve fit ("Let's Make It Fit"). As each investigation progressed, reflection throughout the re-modelling process enabled corrections to methods when unforeseen complications arose. Each of these investigations is outlined below.

#### 3.7.4.3 RE-MODELLING AND RE-MAKING INVESTIGATION 1: RE-MAKING TWO SKIRTS INTO ONE

"Investigation 1: Re-making two skirts into one," was an opportunity to experience re-making as a means to extend the useful life of garments that were otherwise destined for disposal. The two skirts were taken apart and the serviceable pieces reassembled altogether into one new skirt that would replace them both. The shaped fabric pieces from the two skirts guided the new design which was constructed on a mannequin of approximately my own body shape (Figure 3.14 and Figure 3.15).



FIGURE 3.14. DECONSTRUCTED SKIRT PANELS FROM SKIRT 1B.



FIGURE 3.15. INVESTIGATION 1 IN PROGRESS. DECONSTRUCTED PANELS FROM SKIRT 1B ARE PINNED ON TO PARTIALLY DECONSTRUCTED SKIRT 1A.



How they were to be reconfigured comprised the majority of the design activity and although tightly constrained by the parameters of the fabric, was open to vast possibilities. The potential of the textile shapes to fit different parts of the figure was evaluated through pinning and re-pinning around the mannequin, observing, taking photographs to record possible combinations before settling on the final configuration and hand-tacking it in place to take it to the sewing machine for construction. The process was made more challenging by pursuing a minimal waste objective and prohibiting the inclusion of any additional fabric. In hindsight, other reclaimed textile pieces might have been incorporated, provided it did not result in any additional waste offcuts.



FIGURE 3.16. RE-MADE SKIRT EXPERIMENT,  $\frac{3}{4}$  VIEW OF FINISHED GARMENT



FIGURE 3.17. RE-MADE SKIRT EXPERIMENT, BACK VIEW OF FINISHED GARMENT

The minimal waste design approach through modelling on the stand resulted in a garment of angular silhouette where textile panels were seamed together in their existing shapes instead of being recut to a new form (Figure 3.16 and Figure 3.17). By all accounts it was a clumsy attempt at re-making and while it was a resolved outcome insofar as it was a wearable garment, it is also a failure: I have never worn it. Of the waste left over, large sections of faded cotton were later re-used as pocketing, but scraps of lining had no future use and were binned.

## 3.7.4.4 RE-MODELLING AND RE-MAKING INVESTIGATION 2: VELVET SKIRT RENEWAL

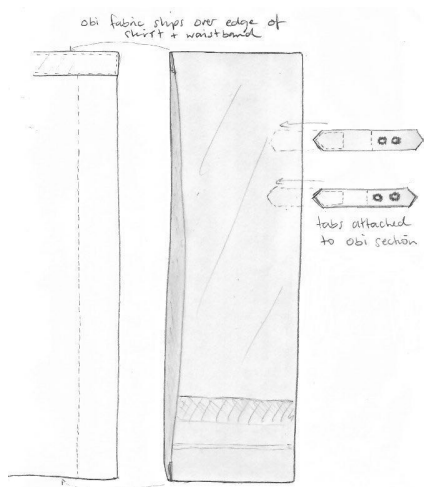


FIGURE 3.18. SKETCH FOR RE-MODELLING THE VELVET WRAP SKIRT.



FIGURE 3.19. VELVET SKIRT RE-MODELLED WITH EXTENDED WRAP FRONT.

The aim of the second exercise was to restore active use to a garment that was no longer being worn because it had become too small. Therefore, the solution sought was not to re-make the garment, but to improve the fit of the skirt in a way that was sympathetic to the original design, since it still had contemporary appeal. The assessment of the skirt had revealed that while it is a wrap skirt, what little provision it offered for enlargement had already been exhausted. The skirt's front buckle closures permitted a small amount of adjustment in size, however the waistband could not be adjusted without moving the only button. This had already been done years previously. The simplest modification was determined to be an extension to the front wrap by stitching on an additional piece of fabric (Figure 3.18). Rather than attempt to match the vintage fabric, a complementary contrast of lustrous satin fabric was chosen in the same colour as the skirt. The fabric was an off-cut of a Japanese obi which had a woven design incorporated into the end. This was positioned to become a design feature on the skirt front. Working with the silk velvet of the skirt required skill and patience to achieve a professional finish to the re-modelling but ultimately the addition of the satin wrap to the skirt enhanced its visual appeal as well as providing a more comfortable fit (Figure 3.19). Through this considered re-modelling for fit, the skirt had also been refreshed in appearance. Had the additional fabric been of contrasting colour, this effect would have been emphasised even more. This was a surprise finding of the investigation, that methods of re-modelling to solve a technical problem with the garment might also be used to re-model the garment's visual appeal.

Although this skirt had the appearance of a wrap skirt, it did not have the functional attributes a wrap skirt might have. Near to this skirt in the wardrobe hangs a vintage woollen Fletcher Jones wrap skirt in the style of a kilt (Figure 3.20), with a deep wrap, long straps through the front buckles and three buttons aligned on the waistband permitting daily adjustment in size. Although sized '12' it is effectively

a multi-size garment and has not needed any alteration. The velvet skirt might easily have been constructed with the same attention to future adjustment in size, enabling long-term active wear, without significant re-modelling.



FIGURE 3.20. FLETCHER JONES' KILT STYLE WRAP SKIRT WITH ADJUSTABLE WAISTLINE FASTENINGS.

#### 3.7.4.5 RE-MODELLING AND RE-MAKING INVESTIGATION 3A: THE BIRD DRESS ALTERATION

*The Bird Dress* is the catalyst for the doctoral study and was also one of the early design investigations. Like the velvet skirt, after years of frequent wear, *The Bird Dress* had become uncomfortably tight around the waist and I was not wearing it often. The analysis of the garment had found that with the exception of the waistline, the dress design was easy fitting: the low armhole of the kimono sleeves, the vertically pleated wrap around bodice and full skirt all comfortably facilitated and flattered variations in body shape and fluctuations in size. Although the waistline was elasticated, at maximum extension, it limited the circumference of the dress. However, at maximum extension, the dress fabric was still gathered around the waistline, suggesting the insertion of a longer elastic would permit a more comfortable fit on a larger figure. Unlike the velvet skirt, the garment design permitted the alteration required. Examining the internal construction of the elasticated waistline revealed that the construction too, permitted the alteration as the elastic was threaded through a casing rather than being stitched into a seam, therefore it was easily removed and replaced with a longer piece (Figures 3.21 and 3.22). Once removed, the elastic was revealed to be stretched and misshapen (Figure 3.23). This is typical condition for elastic in a garment of this vintage. The new elastic was inserted and secured in the same way, with some excess included in the seam allowance at each end to permit future alterations.





FIGURE 3.21 INTERIOR DETAIL OF THE BIRD DRESS FRONT WAISTLINE SHOWING ELASTIC CASING WITH ORIGINAL ELASTIC



FIGURE 3.22. INTERIOR DETAIL OF THE BIRD DRESS FRONT WAISTLINE SHOWING ELASTIC CASING WITH NEW ELASTIC INSERTED



FIGURE 3.23. ORIGINAL ELASTIC REMOVED FROM THE BIRD DRESS WAISTLINE IS TYPICALLY DISTORTED FOR ITS AGE.

Following this alteration, the dress returned to regular use. From this exercise, a strategy for designing adjustable elastic waistlines were determined. Given that elastic perishes over time, it should be inserted in a casing to facilitate replacement. Alternatively, the elastic might be entirely replaced with an internal tie, permitting the wearer to adjust the waistline of the dress on a daily basis without any need to alter the garment.

## 3.7.4.6 RE-MODELLING AND RE-MAKING INVESTIGATION 3B: THE FLORAL DRESS



FIGURE 3.24. INTERIOR  
DETAIL OF THE FLORAL  
DRESS SIDE SEAM SHOWING  
THE ALTERATION AT THE  
ARMHOLE.



FIGURE 3.25. INTERIOR  
DETAIL OF THE FLORAL  
DRESS SIDE SEAM  
SHOWING THE ALTERED  
SIDE SEAM THAT HAS  
BEEN LET OUT AT THE  
WAIST AND TAKEN IN AT  
THE ARMHOLE.



FIGURE 3.26. EXTERIOR DETAIL  
OF THE FLORAL DRESS SIDE  
SEAM AFTER THE ALTERATION  
SHOWING THE FAINT NEEDLE  
HOLES FROM THE ORIGINAL  
SEAM.

*The Floral Dress* alteration extended the findings of *The Bird Dress* exercise. Initiated as a technical exercise to correct poor fit, it too revealed garment design elements as well as construction methods that facilitated subsequent alteration. The dress did not fit me well because it was too full in the bodice and too tight in the torso. Analysis of the garment design and internal construction had pointed to two possible alterations: increase the depth of the pleats in the bodice to reduce the bust circumference and let out the side seams through the waist and hip. Like *The Bird Dress*, the original construction of the garment permitted these alterations with relative ease: the omission of a lining made the interior of the garment easily accessible, the side seam allowances were 2.5cm wide and pressed open, no overlocking was used throughout the garment as the knit fabric did not require edge finishing. The lack of overlocking also enabled the bodice alteration as the original seam allowances were intact, they had not been trimmed as they would have been if overlocked (Figure 3.24 and Figure 3.25). The stitching holes left in the print after the side seams were taken out mostly pressed out, those that remained are insignificant down the sides of the dress, under the arms, disguised by the bold print (Figure 3.26). Like the velvet skirt investigation, *The Floral Dress* highlighted the importance of the fabric type and appearance to the success re-modelling activities: had the fabric not been printed, the original stitching holes would be more visible resulting in a less desirable outcome.

### 3.7.4.7 THE POTENTIAL FOR DESIGN FOR RE-MODELLING TO EXTEND GARMENT USE AND RE-USE

Through the practical investigations of garments at mercy of being discarded, a number of garment characteristics have been noted that should be considered in the design process when designing for extended garment use. Particularly, the success of the second and third investigations suggested a number of design strategies with the potential to contribute to clothing longevity that extend on those of the existing literature:

- that the style of the garment may permit minor fluctuations in body size with no or little alteration,
- that the construction methods may permit or restrict alteration,
- that the fabric also may permit or restrict alteration (stitching holes are visible in re-purposed silk velvet),
- that colour and texture can assist with sympathetic patching by blending in or standing out.

Re-oriented as design tools, these strategies begin to demonstrate *how* the aims of fashion design for sustain-ability might be met through the decisions made at the design development stage.

The surprise success of the renewed look of the velvet skirt further demonstrated that the appearance of a garment can be refreshed and updated through the same methods that might improve fit. Possibly both skirts used in the first investigation may have been re-made more successfully if they had each been treated in a similar way to the third skirt, by the considered addition of fabric to the garments, to replace or conceal the worn components. This finding was in keeping with the literature review into early twentieth century dressmaking and tailoring texts being undertaken concurrently to seek out further existing methods that might be re-purposed.

## 3.7.4.8 REPLICATION OF ARTEFACT: THE SANS JACKET

Similar to the re-modelling exercises, this investigation sought to experience the potential of existing (but contemporary) methods of garment design for sustain-ability through practice, in this case through an exercise in the replication of a garment from a pattern downloaded from a website. As part of their autumn/winter 2007-2008 collection, independent US fashion label Sans<sup>354</sup> sold digital patterns for some pieces of their collections online, alongside the manufactured collections. In press, Sans described ethical motivations for this approach: to reduce the carbon footprint of mass manufacture by allowing the customer to make their own garment, and to make 'good' design available to those on a budget (while a t-shirt sold for US\$85, the pattern for it was US\$6).<sup>355</sup> Makers were invited to personalise a design by varying it in small or perhaps significant ways through the choices of fabrics, colours and pattern modifications. Sans' approach to disseminating their collections as both physical garments and as digital patterns suggests a redirection of the mass-manufacture business model, in keeping with the emerging principles of fashion design for sustain-ability within the study. Further, it aligns with findings of the survey of historical texts which suggest that activities of repair might lead to activities of re-modelling and re-making.



FIGURE 3.27. JOINING THE A4 PAGES OF PATTERN PIECES



FIGURE 3.29. SUPPLIED LABEL



FIGURE 3.28. COMPLETED JACKET

To experience home production of digital pattern download, a Sans jacket style was selected, purchased online for US\$20 and downloaded for construction. The file printed out to 52 A4 pages, of which the first 11 were instructions and the following 41 were pattern pieces to be taped together and

354. Sans has since ceased releasing collections, and the online store is closed. However at the time of writing, the website remains accessible.

355. Lika Volkova, "Sans."



cut out (Figure 3.27). Reading the instructions and constructing the pattern pieces I identified a number of errors and omissions: pattern pieces were missing as were critical details for successful construction (zip lengths and finished garment dimensions). The lack of finished garment dimensions delayed the selection of fabric until a response to my email query was received from Sans. I then selected a black velveteen with a fine white pinstripe, fabric I had on hand in sufficient quantity and of a suitable weight for the style. Correcting the other faults identified in the pattern, required me to draw on my own expertise in garment design and manufacture to achieve the intended outcome (Figure 3.28). I drafted the missing zip facing and lining pieces, corrected grain lines on the patterns and used my own knowledge of construction to assemble the garment as the supplied instructions lacked sufficient detail. A few weeks following the purchase of the pattern, a Sans designer label arrived in the mail to stitch into the garment (Figure 3.29).

While I had anticipated that this would be an investigation of the methods of disseminating garment designs as digital downloads (possibly as an alternative to mass production in advance of sales), the experiment raised more questions than conclusions, particularly in relation to facilitating participatory design strategies for sustain-ability in fashion. The investigation highlighted especially the importance of instructional resources for home manufacture and that consideration needs to be given to the sewer's competency when generating patterns for home construction. Paper pattern companies do this well, indicating a degree of difficulty for the patterns they sell to guide the home sewer on their selection, based on a self-assessment of their skills (in part determined by their competency in making up patterns labelled easy or advanced).<sup>356</sup>

Further, while it was a nice touch to receive the label to sew in, and it gave the jacket a professional finish, I felt almost affronted that my considerable effort in trouble-shooting their mistakes would be concealed by their branding after the fact. Instead, there might be provision for me to put my name on the label as well. I realised that the time and effort I had invested in the garment had resulted in a strong attachment to it. Not just that it was a unique version of the garment of my own construction, but that it had been such a difficult thing to make! Therefore, perhaps by providing space for me to add my own name, a more appropriate label might serve two purposes: acknowledging my attachment to the garment as well as my contribution to its production.<sup>357</sup> Separate to this, it was also interesting that Sans would have its label attached to the garment, the production of which they have no control over. How might my (potentially poor) home construction reflect on their brand?

These observations significantly shape the research study by bringing a focus to the importance of supporting the wearer-maker to act on the sustain-able capacities that may be embedded in garments and further to reward them for doing so. Successful experiences of participation in production could well be addictive: the satisfaction felt upon completing one of their projects might encourage more ambitious projects and in doing so bring about a gradual change in consumer behaviour towards a more active and ultimately sustainable mode of consumption. This potential is further explored in *The Culottes* prototype (Chapter 4).

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356. The grading of papers patterns is further discussed in Chapter 4.

357. The documentation of wearer interactions through garment labelling is further discussed in Chapter 5.



### 3.8 CHAPTER CONCLUSION

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*"A design theorist may make use of material from outside design in ways that would not receive a stamp of approval from the discipline originating the material. The originating discipline has no exclusive rights to the interpretation of its texts."*

- Peter Downton<sup>358</sup>

This chapter has described the synthesis of research methods undertaken to transform my existing fashion design practice for sustain-ability from business-as-usual to a practice of conscious disruption aiming to produce more sustainable design outcomes. This approach has been informed by an overarching action research framework that describes iterative cycles of action appropriate to fashion design: where new ideas are rapidly prototyped using a 'design through making' approach. Within this framework, the manufacture of the garment artefact, especially sewing the toile, allows for reflection-in-action which in turn shapes the direction of the action research cycle.

In addition, redirective practice has been adopted as a means to transform my existing fashion design practice for sustain-ability. Redirective practice has enabled an awareness of the relationality and directionality of design compatible with life cycle analysis. Within the garment lifetime, design is one phase with implications for actions that come before and after. Therefore, the provocation, "what is the likely future impact of this design in the world?" can become a mantra of sorts, to ensure the sustain-ability of design activities undertaken.

Existing methods of fashion design and garment manufacture have been interrogated through object analysis, survey and replication, uncovering existing techniques with the potential to be re-contextualised for sustain-ability. In particular, the potential has been highlighted for historical methods of garment design and construction to be re-introduced into contemporary methods of fashion design to facilitate an extended garment lifetime. However, the same investigations revealed that consumer literacy in identifying the enduring capacity of garments is potentially problematic if design for longevity strategies built into garments are overlooked. This demonstrates how the method of practice, alongside the literature, is able to identify gaps in existing knowledge for further research.

An initial design brief was established as key observations emerged from the practice experiments: reintroduce past garment design and construction techniques to enable future re-modelling, scripting the garment with the potential for more sustain-able clothing practices to extend use and prompt responsible discard. In carrying out the design brief, the obstacles of consumer literacy, competency and perceived obsolescence would need to be addressed. As an approach for sustain-able garment design, this brief is in keeping with the prevalent industry approach of pursuing garment development as a means of creating sustain-able fashion. However, it does so by emphasising the garment's capacity to enable sustain-able use, which this thesis contends is under-explored as a strategy of sustainable fashion design. The expanded repertoire of this phase of the research study, provides a wealth of methods that might be employed in response the brief, in the development of new garment concepts.

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358. Downton, *Design Research*, p.13

The next chapter elaborates on the development of the brief for a suite of garment prototypes derived from the findings of the research for design and research through design activities described here. The initial brief developed informed the first garment prototype *The Cowl Dress*, from which subsequent garment prototypes were developed as further research questions formed. The aim of the suite of prototypes was to test, across a range of garment types and within a contemporary womenswear context, the suitability of the methods of fashion design for sustain-ability being developed. In total six garment prototypes are documented: *The Cowl Dress*, *The Cowl Skirt*, *The Coat*, *The Culottes*, *The Trousers* and *The Layered Top*. In addition to resolving how garments might be designed with the capacity for change in support of extended use by one or more owners, the prototype series continues the investigation into what consumer literacy and skill is required to identify and action such capacities. This leads to a further series of prototypes that focus on developing a suite of supporting resources that both signal and enable the potential for extended use within the garments. Chapter 5 discusses strategies including a QR code garment label that links to a website of resources, featuring tutorials.

## 4 THE LIVING WARDROBE

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In this chapter, an extensive phase of prototyping puts into practice the ideas emerging from the literature and practice review and the research for design activities. Described here as a discreet and chronological phase of the research, the prototyping phase began early in the research study, responding to and further informing concurrent research for design activities in cycles of action research. Research through fashion design practice synthesises emerging ideas from theory into practice, to find out what works. By prototyping original garment designs, the potential strategies of design for sustain-ability in fashion are tested as they emerge from the study, to evaluate their practicality and suitability to the intended context of women's daywear. This experimentation determines how new practices of design for sustain-ability might be incorporated into existing fashion design practices and in what ways existing practices are necessarily transformed. The garment outcomes of the transformed practice are similarly evaluated in their consumer context: how readily they assimilate into existing practices of wearing clothing-fashion and what new skills and habits are required of the consumer to wear the garments with sustain-ability. This phase is critical to the objective of the study to demonstrate how to practice fashion with sustain-ability.

Research into garment life cycle analysis and the practices of clothing use has established the overarching aim of the prototyping phase of the study as the design of clothing-fashion for extended use. Clothing-fashion designed for extended use will likely be worn by more than one owner sequentially or concurrently. To meet the various needs of different wearers over an extended garment lifetime, the research into consumer clothing practices, including the survey undertaken, emphasised the need for garments to be modifiable, to adapt to changes in the wearer's body, and to changes in their personal attitudes and notions of fashion over time. This also indicated that the garment should have the capacity, or affordance to be repaired when worn or damaged. Ideally, the design of the garment prototypes should open the garment to many possible future acts of re-making. The review of historical garments and texts and the various experiments in replication suggested potential methods of incorporating such capacities for change within garments at the point of design.

The chapter structure comprises three parts. First, the series of garment prototypes is framed within the notion of a *The Living Wardrobe*. Practically, this defines the prototypes as a suite of womenswear garment types that comprise an essential everyday wardrobe. Conceptually, it defines the prototype garments as enduring entities with the capacity of long and active lifetimes. Within this section, the prototyping as a practice research method is also detailed. The second part of the chapter sets out the brief for the series of garment prototypes, commencing with *The Cowl Dress* prototype. Following *The Cowl Dress*, the brief was amended in response to the findings of that exercise ahead of the next prototype designed. The garment prototypes were developed iteratively, thus this process is repeated for each subsequent prototype in the series. The final part of the chapter comprises the discussion of these subsequent prototypes, *The Cowl Skirt*, *The Coat*, *The Culottes*, *The Layered Top*, and *The Trousers*, where the method, process and outcome of each experiment is discussed. Each prototype contributes new knowledge to the research study by testing and refining practical approaches in design for clothing-fashion with sustainability. Through the practice the need to support wearers to wear clothing-fashion with sustain-ability emerges as critical to study.

This point is expanded on in Chapter 5, where further research and prototyping activities that investigate how to enable wearers to engage with a living wardrobe are discussed.

## 4.1 DEFINING A LIVING WARDROBE

For this study into methods of fashion design for sustain-ability, it is useful to position the practice within the domestic sphere of contemporary fashionable dressing for women. In part this focus is informed by my own field of commercial practice but it is also logical in consideration of the focus of emerging research into sustainable fashion design. In addition, an everyday womenswear wardrobe will be fostered as the best site within which to generate outcomes that are relevant and accessible to a wide range of designers and wearers that might employ the findings of this research.

The notion of the wardrobe is most readily understood as a space in which to store clothes, as a collection of clothes that belongs to somebody or a collection of clothes for a particular season or purpose.<sup>359</sup> In the paper, "Entering the Space of the Wardrobe", Skov elaborates on the physical space of the wardrobe describing it further as a personal space, a mental space and a social space.<sup>360</sup> As the backstage to daily life,<sup>361</sup> the physical space of the wardrobe is where appearance is constructed, where public expectations and private fears are managed in routinised and mundane behaviours of dressing and maintaining clothing.<sup>362</sup> Citing Woodward,<sup>363</sup> Skov explains that because clothing mediates social experiences and personal interactions, the contents of the wardrobe connect the wearer to their past and so some garments are hard to part with because of the memories they hold. Similarly, the wardrobe also connects to the future; when dressing in anticipation of a likely event (for example, a job interview or date).<sup>364</sup> It is in the wardrobe that notions of public persona and private interior identity<sup>365</sup> converge.

From the inception of this research study, I have referred to it as *The Living Wardrobe*. Norman<sup>366</sup> and Chapman<sup>367</sup> have speculated that animism in product design can contribute to stronger subject-object relationships between people and their possessions, potentially leading to more careful and long-term use of products.<sup>368</sup> Therefore, by vivifying the garments, I seek to give them an independent and enduring lifetime that warrants those garments are worn with care and respect, which in turn enables them to have long and useful lives. Further, by deliberately anthropomorphising the garments within

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359. Ingun Grimstad Klepp and Mari Bjerck, "A methodological approach to the materiality of clothing: Wardrobe studies," *International Journal of Social Research Methodology* 17, no. 4 (2014/07/04 2012), <https://doi.org/10.1080/13645579.2012.737148>

360. Lise Skov, "Entering the Space of the wardrobe" (Wardrobe Ethnographies' conference Herning, OpenArchives@CBS, 2011).

361. A reference to Erving Goffman, *The presentation of self in everyday life* (Edinburgh: University of Edinburgh, 1956). in Skov, "Short Entering the Space of the wardrobe.", p.4

362. Skov, "Short Entering the Space of the wardrobe.", p.5

363. Sophie Woodward, *Why Women Wear What they Wear* (Berg Publishers, 2007).

364. Skov, "Short Entering the Space of the wardrobe.", p.12

365. Barnard, *Fashion as communication.*, p.189

366. Donald A. Norman, *Emotional design: why we love (or hate) everyday things*, Emotional Design, (New York., NY: Basic Books, 2004).

367. Chapman, *Emotionally durable design: objects, experiences and empathy*.

368. For a discussion of animism in product design seen Michael Leube, Laura Ackermann, and Hanna Keimelmayr, "It's Alive: An Empirical Study On Animism And Animacy In Product Design" (paper presented at the Design and Emotion Amsterdam, 2016).

*The Living Wardrobe*, I emphasise their active use and draw attention to the garment lifetime as the site of the study. A *living* wardrobe emphasises the use phase of the garment's life cycle and therefore the study looks beyond the production of the most sustainable fashion garments, to instead explore the potential of fashion design to enable sustain-able<sup>369</sup> ways of living with garments.<sup>370</sup>

*The Living Wardrobe* exists as a series of garment prototypes that comprise the basic components of an everyday wardrobe. In total, six different garment types are included: a dress, skirt, coat, top, culottes, and trousers. By exploring the design and development of a diverse range of garment types, *The Living Wardrobe* tests and advances the evolving ideas of the research by considering:

- What are the typical lower body and upper body garments?
- Do different fabric and construction methods vary across different garment types?
- How do variations in fabric necessitate different patternmaking and construction methods?
- Do garments have a role in determining their own design?

Together, the garment prototypes form a series rather than a collection. While they are linked stylistically through complementary silhouettes, design features, colours and fabrics, the garments are not described or presented here as a fashion collection is typically understood: a range of complementary garments designed in response to a specific season's trends and weather. Instead, they might be described as belonging to what Rissanen has identified as a "shape library".

In his thesis, *Zero-waste fashion design: a study at the intersection of cloth, fashion design and pattern cutting*, (2013) Rissanen researches successful strategies for zero-waste fashion design through fashion practice, with a specific focus on pattern cutting. The collection he produced through his research practice he describes as being based on a shape library:

*The basic garment shapes are pattern cut, toiled, fitted and corrected until they are "perfect" for the requirements at hand, including the desired and appropriate seam and hem allowances around each pattern piece. These patterns can be described as being half-way between a block pattern and a pattern for a specific garment; the garment shape is specific but details such as pockets or collars are not yet designed or pattern cut. For a shirt or a jacket this means perfecting the patterns for the body and sleeve; the neckline to which the collar will eventually attach is decided on, but the collar will be designed later. For a pair of trousers, the main leg patterns are perfected and waist measurement is determined even if the waistband or waist facing is not yet designed.*<sup>371</sup>

This idea of a shape library is a useful way to describe garment patterns that contain more construction information than a traditional pattern block,<sup>372</sup> but are still intended to be a template for further style adaptation and are not in themselves a resolved fashion garment design. In the interests of

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369. Fry, *Design futuring: sustainability, ethics, and new practice*.

370. Tonkinwise, "Ethics by Design, or the Ethos of Things."

371. Rissanen, "Zero-waste fashion design: a study at the intersection of cloth, fashion design and pattern cutting.", p.91

372. A pattern block is "a foundation pattern constructed to fit an average figure." Winifred Aldrich, *Metric pattern cutting for women's wear*, 5th ed. (Boston, MA: Blackwell Pub., 2008), p.17. It does not have any style details (seam lines, pleat, pockets etc.) or seam allowances. The block is adapted into a fashion pattern through the inclusion of style details and the addition of seam allowances appropriate to anticipated construction processes.

contributing to shared terminology in fashion design for sustainability, I adopt the idea of the shape library here to describe my approach to the garment prototypes produced through this research.

The construct of a shape library has been essential to moving the practice beyond its initial aims of developing garment prototypes to investigate and resolve mechanisms within garments that support extended use through re-modelling. As the first few garments developed, the necessity for the garments to also communicate those capacities and facilitate their extended use to potential wearers became evident. Therefore, the aims of the garment prototypes became to produce garments that contained within them both their 'futuring' capacities<sup>373</sup> and the means to communicate and facilitate access to those capacities. This resulted in concurrently prototyping both garments and specific resources to support those garments: Quick Response (QR) code labels that link the garment a website of resources that explain what the garment does and further guides the wearer in taking those actions. In addition, in order to explore the ability for strategies to be applied across the basic garment archetypes that would reasonably be considered the building blocks of any fashion collection, the prototypes would be developed as different garment types. The final list of garments to be developed as a part of *The Living Wardrobe* was: *The Cowl Dress*, *The Cowl Skirt*, *The Coat*, *The Culottes*, *The Layered Top*, and *The Trousers*. The next section gives an account of these experiments and reflects on some of the key findings from each cycle of practice involved in their development.

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373. Fry, *Design futuring: sustainability, ethics, and new practice*.

## 4.2 PROTOTYPING FOR DESIGN

In the prototyping phase of the study, the findings from earlier research activities and from the theoretical framework of the study are tested through practice, where a series of original garment designs are conceived and produced. This phase is an important inclusion in this research study that sought to develop strategies for fashion design for sustain-ability that are accessible and actionable by contemporary designers and wearers of fashion. The intention here was to go beyond the discourse of what goes in the sustainable fashion design toolkit, to investigate how those tools might be implemented in practice and what outcomes are possible. To this end, in addition to being a site of research, each prototype is fully resolved as a wearable garment in fit and construction, to serve as demonstrations of the application of the findings of the research.

A design prototype is "an initial model of an object built to test a design"<sup>374</sup> prior to mass-production. A prototype advances the design process by bringing the design concept into a physical three-dimensional form. It is critical to the successful resolution of a new design concept, revealing unforeseen successes and problems. A design prototype also provides stakeholders (management, clients, investors) with a tangible impression of the final product. Prototyping describes the process undertaken to produce the prototype which generally includes making or 'mocking up' the design object in materials similar to the final outcome. In many design industries, it is impossible to make design prototypes in the specified final materials and forms as those elements do not yet exist (e.g. a moulded plastic casing for a new style of domestic appliance). In fashion, designers are fortunate that prototypes of garment design ideas can be produced inexpensively, rapidly and accurately. A general, fashion design prototyping process can be defined as follows:

1. The initial prototype, a 'toile' is traditionally made in calico, or another inexpensive fabric that approximates the characteristics of the final fabric. This is used to check the basic fit of the pattern and form of the style.
2. Subsequent toiles are produced in calico and the final cloth until the design is successfully resolved and the final prototype, the 'salesman's sample' is achieved.
3. The salesman's sample is generally made by the manufacturer who provides a costing for mass-production derived from the experience of making the sample.
4. This prototype is shown to buyers to secure sales in advance of production and may also be worn by models for promotional photos or shows.
5. The prototype is then given to the manufacturer for reference during mass-production.

For the purposes of this research, *prototyping* refers to the processes undertaken to explore the research concepts by making physical garment artefacts. I also use the term *prototype* to describe the final iteration of each garment style.

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374. "Prototype," in *UXL Encyclopedia of Science*, ed. Amy Hackney Blackwell and Elizabeth Manar (3rd, Farmington Hills, MI: UXL, 2015 2015). [http://link.galegroup.com/apps/doc/ENKDDZQ347975681/SCIC?u=dclib\\_main&sid=SCIC&xid=0c8f739d](http://link.galegroup.com/apps/doc/ENKDDZQ347975681/SCIC?u=dclib_main&sid=SCIC&xid=0c8f739d).

### 4.2.1 PROTOTYPING AS ACTION RESEARCH

*The Living Wardrobe* series investigates the viability of various sustainable design strategies for fashion, alongside the opportunity offered for redirective practice for design.<sup>375</sup> The key aspects explored are:

- fabrics and construction methods to ensure appropriate physical durability for likely use
- provisions for alterations and repairs to maintain fit and condition
- opportunities for customisation to update appearance

The prototyping process involves several cycles of practice, each refining the requirements of the prototype and problem-solving technical issues in order to achieve the optimal sample garment. The planning stage of the prototype development involved the creation of briefs for each garment design based on the above principles that emerged from the survey findings and research for design activities discussed in Chapter 3. The first brief *The Cowl Dress* is lengthy and complex, seeking to respond to everything I had so far encountered in my research. The briefs for subsequent prototypes are much reduced in scope, responding to questions that come from the first prototype. In addition to setting a brief, planning each prototype involves the sketching of a range of possible garment designs: silhouettes, details, fabrics, and colours before selecting one to make up.

In many ways the prototyping process is similar to my established methods of commercial fashion practice with a focus on the realisation of a prototypical garment from two dimensional drawings and patterns to a three-dimensional toile form. Because I design, cut the pattern, and toile the garment myself, this stage is characterised by reflection-in-action.<sup>376</sup> As the design comes to life on paper and then in cloth, the contributing design decisions are reviewed and revised, leading to amendments “on the go” that can subtly or entirely change the garment design. Added to this cycle of reflective, action research was the redirective practice mantra, “what will my design, design?”<sup>377</sup> that framed all design decisions made in the context of their likely future impact in, and on the world.

The action phase blends into the observation phase when reflection on the progress of the developing garment design arrives at the checkpoint of the completed toile. Form, function, and sustaining-ability are evaluated through quiet observation on a mannequin, by trying the garment on, and documented through photographs and notes. Table 4.1 shows a summary of the key criteria for this evaluation. Each prototype was considered in terms of standard design criteria such as fit and style. In addition, the key aspects of designing sustainable fashion garments, based on a review of the literature<sup>378</sup> surrounding sustainable fashion design, and on the outcomes of the earlier research for design investigations, were considered in respect of each prototype.

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375. Fry, *Design futuring: sustainability, ethics, and new practice*.

376. In commercial fashion design practice, the patternmaking and manufacturing stages may be out-sourced.

377. Fry, *Design futuring: sustainability, ethics, and new practice*.

378. Laitala, “Making Clothing Last: A Design Approach for Reducing the Environmental Impacts.”, Niinimäki and Hassi, “Emerging design strategies in sustainable production and consumption of textiles and clothing.”, Rissanen in Gwilt and Rissanen, *Shaping Sustainable Fashion: changing the way we make and use clothes.*, WRAP, *Design for Longevity: guidance on increasing the active life of clothing*.



Fashion Criteria	Design for Sustainability criteria
Fit	Provisions for alterations
Style	Provisions for repairs
Easy to wear	Provisions for customisation
Easy to care for	Simplification of construction
	Simplification of materials palette

TABLE 4.1. EVALUATION CRITERIA FOR PROTOTYPES

These notes are roughly jotted down on scraps of paper at hand and kept with the paper pattern until the revisions are made. As discussed above, pattern changes are generally made in a contrasting colour pencil to permit restoration of a previous version should the change not be successful (Figure 3.5). The pattern changes are referenced to specific toiles (identified with calico tags) such that the chronology of each design’s evolution is maintained through both pattern and toile (Figure 3.6).

The reflective design practice was extended beyond the scope of self-reflection through peer critique that involved positioning the observations made within the context of the larger research study with an expert panel made up of supervisors and external panel members. During the research, reflections that concluded the major cycles of research practice were formally written up and presented twice yearly at practice research symposiums where the on-going research project received feedback from an academic panel and audience of peers. These public moments of reflection contributed greatly to the development of the research: requiring the collation of work-to-date for presentation to receive timely feedback. During the major prototyping phase from 2011 to 2013, the research project was presented in this way seven times and the documentation associated with these presentations forms a valuable snap-shot of my thinking at the time.

### 4.3 INDIVIDUAL BRIEFS FOR THE LIVING WARDROBE SERIES

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This section describes how *The Cowl Dress* was used as the basis for the development of a shape library<sup>379</sup> to explore the potential of various initiatives that arose through the design practice to be applied to contemporary fashion practice as a more sustain-able alternative to existing models of sustainable fashion design practice. The aim was to begin with a single garment experiment that could then evolve iteratively, where lessons learned through each experiment were used to inform and improve the next garment designs as they progressed. The initial brief focused on one garment type, the dress, and resulted in the first prototype in the series: *The Cowl Dress*. The decision to first prototype a dress style was initially informed by the Survey of Consumer Practices in Australia survey undertaken at the commencement of the research study, in which dresses featured prominently in the category of those garments kept but no longer worn (see Chapter 3).

The process of developing a brief for *The Cowl Dress* involved deeper thinking about the longevity of the garment and to identifying factors that would impact the use phase of the resulting garment artefact. For example: design speculation on the future wear and tear of the garment led to greater consideration of the importance of technical functionality to support potential future re-modelling. This led to a number of propositions: If the dress would be worn over an extended period, it may need to be let out? If it were to change hands, it might need to be taken in? In this case, would additional fabric be needed for repairs?

Findings from the preliminary research activities suggested this might be facilitated through the reintroduction of traditional garment construction techniques no longer widely used in ready-to-wear womenswear. The research through existing garment production practices (Chapter 3) revealed a number of existing techniques, both familiar and unfamiliar, that might be re-integrated into contemporary design practice to facilitate future alteration. Common problems that lead to premature disposal of fashion garments that are otherwise still valuable and simple design decisions that can address these through the initial design process<sup>380</sup> are summarized in Table 4.2 and framed approaches to designing *The Cowl Dress*. As a result of these questions, a proposition developed that the garment might be scripted (see Chapter 3) with more sustainable clothing practices to potentially extend use and prompt responsible disposal.

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379. Rissanen, "Zero-waste fashion design: a study at the intersection of cloth, fashion design and pattern cutting.", p.91

380. This list is gleaned from the research through existing garment production practices and my personal and professional experience. Little research exists on specific physical garment characteristics that prevent a garment from being worn. One such reference is Laitala, "Consumers' clothing disposal behaviour – a synthesis of research results."

<i>Principle</i>	<i>Method</i>	<i>Application example/s</i>	<i>Examples from The Living Wardrobe</i>
<i>Provisions for alterations – garment is too short for its wearer</i>	Allow additional fabric through the body and sleeve length	Tuck in Sleeve lining Tuck in Bodice waistline Hem allowance	<i>The Cowl Dress</i> <i>The Coat</i> <i>The Trousers</i>
<i>Provisions for alterations – garment is too tight for its wearer</i>	Wide seam allowances	Centre back and side seams Hem allowance	<i>The Cowl Skirt</i> <i>The Culottes</i> <i>The Trousers</i>
<i>Provisions for alterations/repair – broken fastenings makes garment un-wearable</i>	Hand-sewn fastenings	In place of mechanically applied	<i>The Cowl Skirt</i> <i>The Culottes</i> <i>The Trousers</i>
<i>Provisions for repair – garment has a hole or tear/rip that needs fabric for patching or mending</i>	Additional fabric Use of contrasting fabrics within garment	Included in pocket bag Hem allowance Contrast fabrics used in areas likely to be soiled permits replacement of those parts with another compatible (but different) fabric	<i>The Layered Top</i>
<i>Durable fastenings – broken zip makes garment un-wearable</i>	Placket	Button/press stud/hook and eye closure replaces zip	<i>The Cowl Skirt</i> <i>The Culottes</i> <i>The Trousers</i>
<i>Reinforcement of areas of wear – fabric is worn out in area of stress or friction</i>	shields	Underarm, seat, trouser hem, back neck	<i>The Trousers</i> <i>The Coat</i> <i>The Layered Top</i>
<i>Accessible construction – industrial specialist machine stitching is too difficult to unpick to all for repair/adjustments</i>	Straight and zig-zag, lock-stitch sewn seams	In place of multi-thread chain stitching (e.g. 5 thread overlock)	<i>The Coat</i> <i>The Layered Top</i>

TABLE 4.2. HISTORICAL GARMENT PRODUCTION METHODS THAT MIGHT BE RE-INTEGRATED INTO CONTEMPORARY DESIGN PRACTICE TO FACILITATE FUTURE ALTERATION

#### 4.4 BRIEF FOR THE COWL DRESS

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The brief for *The Cowl Dress* as the first prototype in this study, was, on reflection, ambitious. Based on up to two years of research into existing theory and methods relevant to design for sustainability, the brief focused on three ideas for producing more sustainably designed fashion by designing for i) flexibility in size, ii) including some simple in-built style variation as it was worn, and iii) facilitating future alteration and re-modelling by a home sewer. The capacity for modification in size and style informed an approach to the design of the dress that favoured a simple silhouette comprising few parts.

The anticipated simplicity of the garment's manufacture further suggested that those provisions within a garment that enable repair and re-modelling, might also enable its initial making. This led to a second objective being added to the brief: that the dress might be manufactured by the home sewer from a pattern, as an alternative to being purchased ready-made. While home manufacture might not be within all wearers' capabilities, at the time the prototyping commenced, the possibility was considered an important inclusion towards encouraging greater participation in the home manufacture of fashionable clothing. I considered that success in small actions of repair and re-making might foster the inclination to attempt home manufacture of a garment. Therefore, I sought to support that possibility within the garment design and developed a design brief that sought to support of home manufacture, re-manufacture, repair or re-use.

Extending the conceptual constraints of the brief, a list of specific requirements of the brief read as follows:

- An easy to wear garment
- Construction and pattern making methods that facilitate easy alterations.
- Construction and pattern making methods that facilitate assembly by a home sewer
- Fabric that ages well
- Fabrics and trims that are easily obtainable at retail fabric stores
- A style that facilitates personalisation of the design through variations of the fabric and design details.
- Aesthetic considerations: a garment that is a pleasure to wear because of its appearance and the experience of wearing it.

#### 4.4.1 PROTOTYPING THE COWL DRESS

In this case, *The Cowl Dress* was prototyped a number of times, first in calico, then a black linen/synthetic blend, followed by an aubergine pure wool prototype and finally a navy/grey wool-blend check (Figure 4.1). Each prototype refined the fit, proportions, construction methods used and functional elements of the dress. Further, the series of dress prototypes tested the design in a variety of fabrics of different weights and constructions.<sup>381</sup>



FIGURE 4.1. THREE PROTOTYPES OF THE COWL DRESS PROGRESSIVELY REFINE THE SHAPE, FIT AND DETAILS, AND TEST THE DESIGN IN DIFFERENT FABRIC TYPES.

Inspired by the enduring style of *The Bird Dress* (see Chapter 1), *The Cowl Dress* design seeks to be a flattering style that provides a comfortable fit on a variety of body shapes (easy to wear). It features an ankle-length skirt, with an empire bust line, modest neckline, gathered bust detail, back waist darts and generous side pockets (Figures 4.2 and 4.3). The design is in keeping with the prevalent contemporary taste, rather than making specific reference to current fashion trends. My own taste in design has

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381. At this point in the research project, the fabric used in the prototypes was anticipated to be a significant consideration, but as the research progressed, the emphasis shifted from the materials and processes used to create the design outcome, to the capacity for design to facilitate responsibility for sustainability.

determined the form of the dress and how the functional features are met within it, for example that variation in wearing the garment is provided by buttons in the cowls that sweep up or release the fullness of the skirt. The first prototype of a design, as an entry in a designer's shape library,<sup>382</sup> tests a basic idea and provides the template for development of the design in multiple aesthetic variations intended as commercial fashion outcomes.



FIGURE 4.2. ORIGINAL CONCEPT SKETCH FOR THE COWL DRESS

The outcome from the progressive refinement of the toiles involved in resolving *The Cowl Dress* shape, is a suite of construction and pattern making methods that might facilitate assembly, repair or re-modelling by a home sewer across its extended use-life. These include: a pattern comprising as few pieces as possible, simple construction methods that require a limited range of machinery and other sewing equipment, familiar domestic construction processes, fabrics and trims that are easily obtainable at retail fabric stores (e.g. standard dimensions). Easy alterations have been pre-empted by using straight seams, generous seam allowances and minimal shaping to the body (Figs. 4.3., 4.4. and 4.5). The buttons around the hemline allow the cowls to be caught up or let out to vary to drape of the skirt. Adjustable shoulder straps facilitate a good fit over the chest and pockets in the side seams offer utility so often lacking in women's wear. On the inside, a row of stitching in a contrasting coloured thread along the empire line of the bodice may be easily unpicked to reveal deep seam allowances through the side seams. This allows the dress to be let out (or taken in) a whole size through one continuous seam in the side of the skirt, bodice and facing.

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382. Rissanen, "Zero-waste fashion design: a study at the intersection of cloth, fashion design and pattern cutting."

If manufacturing the garment from a pattern, personalisation of the design might be made through varying the design details and in the selection of fabric. This list of technical methods demonstrates how the initial list of sustain-able garment design principles of can be implemented (Table 4.2).



FIGURE 4.3. THE COWL DRESS THIS SLEEVELESS DRESS FEATURES AN EMPIRE LINE BODICE AND MAXI LENGTH SKIRT WITH COWLS ON EACH SKIRT PANEL SEAM.



FIGURE 4.4. THE COWL DRESS: INTERIOR BODICE DETAIL.



FIGURE 4.5. THE COWL DRESS: INTERNAL CONSTRUCTION DETAIL.

In addition to the technical resolution of the design, prototyping as a research method includes development and refinement of the research objectives and questions through the evolution of each garment. In this case, critical reflection throughout the iterations of *The Cowl Dress* experiment raised concerns about the accessibility of the 'futuring' capacities<sup>383</sup> of the garment. For example, given that domestic sewing skills are no longer widely learnt or practiced,<sup>384</sup> it could not be assumed that traditional construction methods, like wide seam allowances, will be readily recognised as indicators of the garment's affordances for re-modelling and repair, and consequently, that the wearer has the skills necessary to act upon them.

383. Fry, *Design futuring: sustainability, ethics, and new practice*.

384. Goworek et al., "Consumers' attitudes towards sustainable fashion: Clothing usage and disposal.", Gwilt, "What prevents people repairing clothes?: an investigation into community-based approaches to sustainable product service systems for clothing repair.",

Norum, "Examination of Apparel Maintenance Skills and Practices: Implications for Sustainable Clothing Consumption."



However, as indicated by the Survey of Consumer Practices in Australia survey previously conducted, an inclination exists within some consumers to learn how to extend the life of their clothes through such strategies (see Chapter 3), and is discussed further in the following paragraphs.

Reflecting on this during the experiment led to a further question: How then might the garment enable the uptake of sewing skills for repair and re-modelling? The process of attempting to answer this question led to an additional experiment that explored the mechanics of scripting (see Chapter 3) as well as a method for disseminating sustain-able design alongside methods for up-skilling future wearers in order to extend the effective use phase of the garment. Here we see an example of how the research methods of literature review, surveying and design prototyping converge and a new avenue of investigation in support of the aims of the research study emerges: in this case, mechanisms that might be designed into the garment to up-skill wearers in simple acts of repair and re-modelling. Thus, the objectives of design prototyping within the research extends beyond those typical of a commercial practice (the resolution of the garment as functional and fashionable), to resolve how the garment might signal its 'futuring' capacities and encourage interaction between designers and wearers of fashion garments.

Investigations into ways in which garment design might enable the uptake of sewing skills for repair and re-modelling led to closer consideration of the capacities of the wearer to interact with the garment. From this arose a further question: how to allow for wearers' variable capabilities in sewing skills? Research into existing self-directed garment construction tools and reflective analysis of my teaching practice suggested that a range of interactions from simple to advanced might be 'scaffolded'<sup>385</sup> within the one garment. When making garments at home, highly skilled home sewers may design and produce their own garment patterns, however it is more usual that patterns are purchased from dressmaking retailers. Paper pattern designs are released seasonally by publishers, reflecting the current fashion trends. Home sewers select a style from the collection and purchase a tissue paper print of the pattern pieces which they cut to the required size. Included with the paper pattern are suggestions for suitable fabric types and illustrated fabric cutting and sewing instructions. To assist home sewers to select a pattern appropriate to their skills, publishers like McCalls,<sup>386</sup> rate their patterns by level of difficulty (Table 4.3).<sup>387</sup> As the description for the 'advanced' patterns implies, there is a correlation between the degree of difficulty and the look of the finished garment. More advanced skills are needed to create finer quality garments consistent with a 'couture' style.

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385. Elizabeth B.-N. Sanders, "Scaffolds for Building Everyday Creativity," in *Designing effective communications: creating contexts for clarity and meaning*, ed. Jorge Frascara (New York : Garsington: Allworth, 2006).

386. McCalls also publish Vogue, New Look and Simplicity patterns.

387. Meg Carter, "Can Beginners Sew Vogue Patterns?," McCall's Blog, McCall Pattern Company, November 1, 2017, accessed September 10, 2018, <http://blog.mccall.com/2017/11/01/can-beginners-sew-vogue-patterns/>.

Alternatively, BurdaStyle rates their patterns: Beginner, Easy, Intermediate and Experienced, without providing definitions for the levels.



**Grade Definition**

VERY EASY	The easiest and quickest patterns to sew. Great for beginner or the experienced sewer with limited time available. Expect limited construction details, hand sewing and fitting. Easy-to-sew fabrics are recommended.
EASY	Easy-to-sew patterns but with more details than the Very Easy category. Perfect for those with limited sewing knowledge or little time. Expect a wide variety of sewing procedures—there will be more details when the techniques are simple and fewer details when the techniques are more involved. Some fitting knowledge required.
AVERAGE	These patterns are perfect if you have more time to sew, and more experience sewing. Look for challenging designer techniques, tailoring, unique construction details. Expect more fitting and inner construction. Find more variety in fabrics from the stretchiest knits to synthetic leathers and suedes.
ADVANCED	The finest patterns featuring the best of European and American Couture. Perfect for those who like the sewing challenge of professional tailoring and fine couture techniques. Expect intricate fashion shaping, hidden construction details, couture inner construction, fine touches of hand sewing and bias draping.

TABLE 4.3. CONTEMPORARY DESCRIPTIONS PROVIDED BY MCCALLS TO RATE THE DEGREE OF DIFFICULTY OF THEIR PAPER DRESS PATTERNS.

During the development of *The Cowl Dress*, I pondered whether garments designed to be later re-modelled would benefit from a similar rating scale. In addition to guiding the home sewer, for the designer, the potential advantage of a rating system for either home manufacture or re-modelling, is being able to design within ranges of defined capabilities. This permits the resulting collection to comprise both simple and complex looking styles with correspondingly simple and complex methods of (re-)manufacture. However, this approach is unlikely to adequately support a garment that may pass between wearers of differing capabilities a number of times throughout its lifetime. To complicate matters, *The Cowl Dress* was an attempt to design a garment that could be made at home *and* later re-modelled, possibly requiring two rating scales, since skills needed for re-modelling are not necessarily as advanced as those required for manufacturing. I considered that a rating scale might introduce a complication that could well undermine the objectives of the research. Insofar as wearers may not be to effectively grade their own skills or may perceive a scale of skills to be off-putting. Therefore, the potential to cater for a range of levels through the scaffolding of skills within one garment is investigated in *The Cowl Dress*. Within *The Living Wardrobe* series, every garment has discrete life-extension actions that can be undertaken at all skill levels.

#### 4.4.2 EVALUATING THE COWL DRESS: FOSTERING PARTICIPATION

In seeking to enable novice wearers with the inclination to learn to sew, I considered that a project-based approach might be easier to attempt, rather than learning general sewing skills with no specific application. I hypothesised that re-modelling a garment in their wardrobe to extend its lifetime may give purpose to the acquisition of skills with the promise of an immediate reward: the return of the garment to regular wear. How I might go about this was informed by my teaching practice, specifically from teaching commencing undergraduate fashion design students how to sew. The first-year course expects no pre-requisite skills of the students and so commences with a series of sewing exercises to demystify the craft and provide an immediate return for effort, be it simply the achievement of neat rows of parallel lines of stitching or a patch pocket secured to a square of calico. Competent practice follows quickly and after a few more classes students have each produced a skirt (complete with zip). By the end of the year my role in the class shifts from teacher to mentor as the students each advance their mastery of the craft in pursuit of their individual interests. The curriculum is carefully designed to balance challenge against the students' skill level, to engage them in a cycle of attempt and reward in which each achievement advances their capabilities and builds their confidence. Maintaining this balance is critical to the students' enjoyment of the experience: when the task is too difficult anxiety sets in, when it is too simple, students become quickly bored.<sup>388</sup> When their skills are matched by the challenge of the lesson, sewing becomes an absorbing and enjoyable task in itself, not merely a skill one learns to achieve an end.

The design of *The Cowl Dress* and subsequent prototypes within this research seek ways to adapt this classroom experience to the DIY home environment. Replacing the teacher with a series of self-directed design interventions centred on the re-modelling and re-making of a specific existing garment, employs the same underlying principle: from the initial safety of prescribed lessons (garment re-modelling), experimentation is encouraged until the teacher is no longer required (home manufacture of the garment). Scaffolding<sup>389</sup> capacities for re-modelling into a garment like *The Cowl Dress*, potentially enables a range of interactions that support an extended garment lifetime. Change can be actioned by wearers at a level appropriate to their skill, as there is provision for both simple acts of mending and advanced acts of re-making. At the same time, the scaffold of challenge-and-reward interactions within the garment may encourage wearers successful in simple modifications, to attempt more advanced actions of making and re-making. This approach recalls the structure of the curriculum described above, and of the text *Practical Home Mending Made Easy* where the mending skills explained in part one support the garment refashioning methods of part two (see Chapter 3). In addition, in keeping with the lessons of the classroom and the text books, the skills acquired in re-modelling *The Cowl Dress* and other prototypes, are transferrable to further sewing projects. The wearer is enabled beyond the immediate application, to implement adaptation of the methods used

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388. Mihaly Csikszentmihalyi and Isabella Selega Csikszentmihalyi, *Optimal experience : psychological studies of flow in consciousness* (Cambridge ; New York: Cambridge University Press, 1988)., p.30

389. Sanders, "Scaffolds for Building Everyday Creativity."

to similarly re-model other garments in the wardrobe. Where garments do not afford such intervention, reflection on their failings is pause to reconsider purchasing habits.

As discussed previously, Fletcher's research highlights already existing practices of extended garment use and suggests these might be amplified through design (see Chapter 2). Embedding opportunities for interventions within garments, scaffolded for a range of wearer capabilities, proposes how this might be achieved, by accessing wearers' 'everyday creativity'<sup>390</sup> to encourage adoption of new sustainable clothing practices. In her discussion of scaffolding, Sanders describes four levels of everyday creativity: doing, adapting, making and creating.<sup>391</sup> These are defined in Table 4.4 below and extended to *The Cowl Dress*.

Level of creativity	Motivations	Requirements	Cowl dress
Doing	To get something done / to be productive	Minimal interest Minimal domain experience	Button up or release cowls in the skirt
Adapting	To make something on my own	Some interest Some domain expertise	Adjust side seam for better fit
Making	To make something with my own hands	Genuine interest Domain experience	Make the dress from downloaded pattern OR re-make dress into a new garment
Creating	To express my creativity	Passion Domain expertise	Transpose skills learnt above to the manufacture of an original garment design

TABLE 4.4. SANDER'S FOUR LEVELS OF CREATIVITY MAPPED TO THE COWL DRESS.

*The Cowl Dress* design seeks to provide opportunities for interaction at each level, with the intention that engagement at the lower levels of creativity might be set up such that they lead to a further interaction at a higher level. Enabling garment interventions for different levels of skill and creativity and encouraging progression through the levels of creativity from doing to creating, presents a significant challenge to garment design, particularly in light of diminishing skills in clothing maintenance within the general population in recent decades.<sup>392</sup> In 2015, Lapolla and Sanders conducted a study to explore what opportunities exist to encourage more personal creativity when reusing and repairing discarded clothing.<sup>393</sup> They found that "participants with aspirations at any level of creativity desired guidance or increased expertise to be more creative when repairing and reusing apparel."<sup>394</sup> This suggests that a perceived lack of skill is a barrier to the enduring capacities of the

390. See Richards, R. (2010). Everyday creativity process and way of life—Four key issues. In J. Kaufman & R. Sternberg (Eds.), *The Cambridge handbook of creativity*. (pp. 189–215

391. Sanders, "Scaffolds for Building Everyday Creativity."

392. Norum, "Examination of Apparel Maintenance Skills and Practices: Implications for Sustainable Clothing Consumption."

393. Lapolla and Sanders, "Using Cocreation to Engage Everyday Creativity in Reusing and Repairing Apparel."

394. Lapolla and Sanders, "Using Cocreation to Engage Everyday Creativity in Reusing and Repairing Apparel.", p.195

garment being actioned, leading to the question whether garments designed for re-modelling necessarily must provide not only the means but also the method to do so.

#### 4.4.2.1 THE COWL DRESS: HOME CONSTRUCTION KIT

To investigate whether *The Cowl Dress* can be produced at home, an experiment was developed in which the pattern, fabric and written (not illustrated) instructions were given to a highly skilled machinist, to make up at home. *The Cowl Dress* had been designed not only to be easy to re-model after a period of wear, but to be readily manufactured by someone with average<sup>395</sup> skill at home, using typical domestic sewing equipment: a sewing machine, overlocker (optional) and steam iron. An expert was selected for this first test to provide an informed perspective and assist with troubleshooting issues that might arise. This permits me to more readily distinguish any failings of the garment from those of the machinist.

The expert machinist was a colleague at RMIT University. My colleague kept a diary during the making process which took her 16 hours and 15 minutes, including cutting. She commented at the end of the diary that the dress was one of the most challenging things she had made in some time. Her notes throughout the making process explained this surprise finding, indicating she had encountered problems due to the size of the skirt pattern pieces and the choice of fabric (an open weave check). Cutting the loosely woven cloth to match the checks was time consuming, and because of its dimensional instability, she added steps to the construction instructions provided to ensure she achieved what she considered to be a good finish. This reiterates Jelsma's point that users tend to subvert scripts as it suits them.<sup>396</sup> In a domestic environment, the large skirt pieces of loosely woven wool/poly check fabric were unwieldy and difficult to handle when sewing the long bias seams to ensure that the checks matched and the seams did not distort. However, the machinist noted that the open weave of the fabric disguised stitching marks when seams were unpicked, which would be of benefit when re-modelling the garment into the future. A more stable fabric would overcome some of these challenges, yet the large pattern pieces might still pose a challenge to the inexperienced sewer to cut and construct.

The experiment successfully produced a beautifully finished garment, arguably because of the skill of the machinist to overcome unforeseen challenges created by a combination of design decisions: the complication of an open weave check fabric in the construction of large skirt panels. A less-skilled machinist may not have been so successful. This finding reinforced what I had learnt myself as a home sewer prior to my education: that even when supplied with explicit instructions for the home manufacture of a garment, fabric choices and skill level significantly impact the success of the outcome. In passing on a design with instructions for its manufacture, a producer relies on the home sewer to correctly anticipate their own capability to construct the garment and that they can make appropriate fabric choices. For the home sewer there is great potential for error in these decisions, even when

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395. Average skill here would equate to Easy-Average on McCalls' paper pattern rating scale discussed above.

396. Jelsma, "Designing 'moralized' products." See Chapter 3.

guidance is provided. In contrast to the experience of home production, in mass production, skilled manufacturers using industrial equipment can easily accommodate challenge of large skirt panels and dimensionally unstable fabric. It is unlikely that *The Cowl Dress* would be difficult for a factory to manufacture in the check cloth. The outcome of the experiment suggested that disseminating a garment style as a pattern for home manufacture in addition to selling the style ready-made, is not an easily implemented extension to the existing fashion design and production processes. The similarly challenging experience I had sewing up the Sans jacket supports this (Chapter 3).

As a first prototype, *The Cowl Dress* was significant by attempting to do too much with the aim of being both suited to home manufacture and later alteration. Attempting both simultaneously was essential to developing realistic ambitions and early reflections over the scope and possibilities for each experiment within the project, and equally to refine and inform the overall project aims. For example: this initial experiment highlighted that design for home manufacture or industrial manufacture may require quite different design approaches to ensure successful outcomes. This finding called into question whether the research study should pursue home manufacture as an aim or focus on re-modelling existing garments. Given that the fabric choice was largely responsible for the challenges the machinist encountered in *The Cowl Dress*, the final decision was that no definitive decision could be made on the findings from a single experiment and the provision for home manufacture continued to be given consideration in the development of subsequent prototypes.

The development process also revealed that there would be an advantage to having an overall project plan, with research aims and objectives that could be explored through different prototypes. The planned series of prototypes could be developed in cycles that overlap to expedite early findings from one cycle of practice to refine future iterations of design practice (Table 4.5).

The iterative approach to prototyping was crucial in testing and building up the conceptual and technical learnings from one activity to the next. For example, the traditional tailoring methods successfully applied to *The Cowl Dress* were tested in the next two prototypes, *The Skirt* and *The Coat* in order to determine if the same principles and techniques worked across these garment types. I considered that the approaches to design and construction I had developed would be most readily available to other designers, if they might be applied to a variety of garment designs rather than developing solutions limited to specific to garment types.

Prototype timeline															
Style	2011		2012			2013					2014		2015	2016	
	September	December	June	?	December	February	March	June	October	December	March	July	LOA	January	April
Cowl dress	black linen blend				aubergine wool	check wool blend									
Cowl Skirt		Strip cotton toile		Navy wool											1) black linen 2) navy wool
Straight coat			Grey wool				Black boucle knit								cream textured silk
Layered top 1								grey wool	black wool/velour		1) stripe cotton toile 2) black wool				
Layered top 2														1)cream toile 2) black wool	black wool/velour
Culottes										khaki wool	check wool	bone linen			black linen
Pants 1															black wool
Pants 2															black wool

TABLE 4.5. A VISUAL REPRESENTATION OF THE PRACTICE EXPERIMENTS SHOWING HOW THE CYCLES OF PRACTICE INTERACTED WITH EACH OTHER THROUGHOUT THE RESEARCH.

## 4.5 THE COWL SKIRT

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FIGURE 4.6. THE COWL SKIRT WORN WITH  
THE LAYERED TOP



FIGURE 4.7. THE COWL SKIRT

### 4.5.1 THE DESIGN BRIEF: PROVISIONS FOR RE-MODELLING

In keeping with the project aim of creating a series of garments that might comprise a basic wardrobe, the second prototype chosen to be developed was a skirt (Figure 4.6 and Figure 4.7). The design carries over the skirt silhouette and feature cowls from *The Cowl Dress*, set into a shallow yoke and includes cut away side pockets. The skirt continues the technical experimentation with garment features that facilitate future re-modelling, adapted as appropriate to a lower body garment. In response to the findings of *The Cowl Dress*, consideration of design for home manufacture was put aside in favour of refining the provisions for re-modelling.

The fit around the waist of a skirt is critical to the garment's suitability to long-term wear, that it can accommodate fluctuations in girth over time. Therefore, the mechanism of the waist closure was the main consideration in the development of this prototype. I considered this might be approached in two key ways: through the design of a garment with a mechanism to transform the fit during wear (e.g. perhaps a drawstring waistband or wrap front with adjustable fastenings<sup>397</sup>), or through the provision for tailored alterations that enlarge or reduce the waist girth of an otherwise fixed size.

In deciding how to approach the design for an adaptable waist fit, my main consideration was that the functionality of the waist closure should not dictate the design features. For example, a drawstring waistline generally requires a generous cut to fit over the hips which is gathered around the waistline, while a wrap skirt dictates a silhouette with generous volume (for example: kilt, sports skirt). Given my interest in tailored garments and knowledge of their construction, my inclination was to pursue a design that looked to adapting traditional methods of men's tailored trousers to contemporary womenswear design features. While this prototype features a fitted yoke waistline, my intention was to develop a waist closure mechanism that might be used on a variety of close-fitting waist styles.

### 4.5.2 PROTOTYPE DEVELOPMENT

Implementing the brief for an adjustable skirt waist closure mechanism required consideration of the materials, the pattern design and the construction methods of the closure. The use of a zip in *The Cowl Dress* had raised the consideration of the durability of applied fastenings to garments: zips, buttons, studs, buckles and so on. Because of their susceptibility to perish through repeated use and washing and the difficulty of replacing them, zips are especially problematic when applied to garments designed for longevity. Zips are widely used to secure garments of all kinds to the body. They are easily concealed within seam lines or may be used as a design feature, and generally cost less than alternative closures to purchase and sew in. The quality of their manufacture can vary greatly which impacts on their durability. In my experience, a broken zip can be reason to discard an otherwise serviceable garment.<sup>398</sup> The suitability of the type of zip used can also impact its durability if the wrong zip is applied

397. See for example the wrap skirt investigation in Chapter 3.

398. Zips also present a barrier to successful garment recycling because they need to be removed from the garment before the textile can be



(for example, an invisible zip inserted through thick fabric or in a location that is under strain during wear). The replacement of a broken zip in a garment is hampered by the assembly process which typically sets the zip into a garment as one of the first steps of construction. Removing a broken zip can necessitate taking much of the garment apart. In addition to the consideration of the material robustness of a zip fastening, the inclusion of a zip in a garment prevents the closure being made adjustable and complicates future alteration in size at that opening in the garment. In light of these considerations, an alternative closure was sought to the popular use of zips in skirts, one that would be both robust and adjustable.

In place of a zip, *The Cowl Skirt* uses a combination of buttons and sew-on press studs to secure the waistline. This mechanism adapts the placket found in garments before the invention of the zip (Figure 4.8). Placket openings join lapped edges of the garment with buttons, press studs, hooks and eyes or a combination of these.

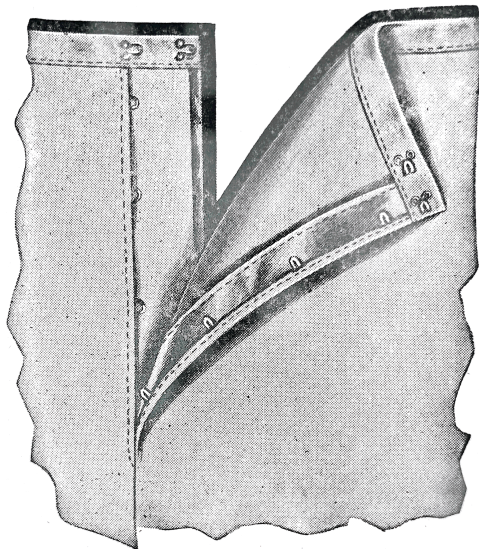


Fig. 125. Finished Placket on Habit Back Skirt

FIGURE 4.8. HOOK AND EYE SKIRT PLACKET. ONE OF A NUMBER OF VARIATIONS ILLUSTRATED IN BUTTERICK'S *THE DRESSMAKER* (1916).

The waist girth on *The Cowl Skirt* can be altered by moving the buttons and press studs (Figures. 4.9 and 4.10). For this reason, sew-on press studs are used in place of machine applied studs which pierce the fabric on application and cannot be removed. Duplicating the opening on either side of the skirt front provides for greater adjustment using this method, which is easily undertaken using hand sewing equipment. Additional provision for alteration is provided by the deep centre back seam allowance which can be adjusted by unpicking the interior yoke seam line, in much the same way as the side seams on *The Cowl Dress* are adjusted.



FIGURE 4.9. THE COWL SKIRT (DETAIL). THE SKIRT OPENING IS CONCEALED IN THE SIDE POCKETS.

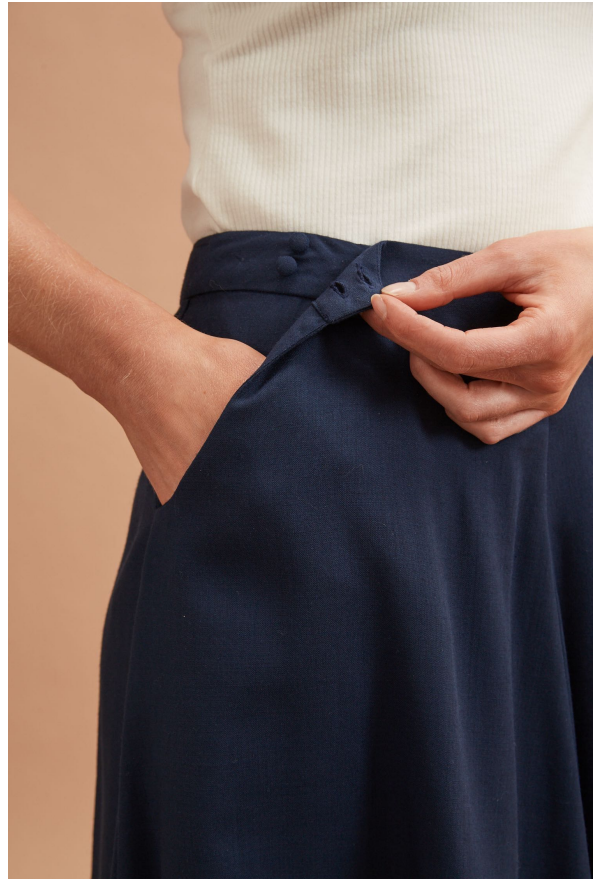


FIGURE 4.10. THE COWL SKIRT (DETAIL). THE WAIST CIRCUMFERENCE IS ADJUSTED BY MOVING THE BUTTONS AND PRESS-STUDS

This action requires greater sewing skill and access to a sewing machine. I also considered that adjusting a tailored garment would likely require the wearer to have more confidence in sewing and construction before attempting a re-modelling activity such as this one. I hypothesised that additional supporting resources may be needed to encourage participation.



FIGURE 4.11. THE COWL SKIRT INTERIOR DETAIL: THE CONTRAST STITCHING INSIDE THE WAISTBAND INDICATES WHERE TO UNPICK THE SEAM TO MAKE ALTERATIONS

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### 4.5.3 EVALUATION OF THE PROTOTYPE COWL SKIRT

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*The Cowl Skirt* is the most technical of the prototypes, successfully resolving a method of adjustable waist closure for lower body garments. Several toiles and patterns were needed to integrate the adjustable closure into the yoke, pocket and waist shaping for the skirt. Given the two in-built mechanisms for future alteration, *The Cowl Skirt* prototype reiterated the need to explicitly communicate to the wearer the “futuring” capacities<sup>399</sup> of the garment that might otherwise be overlooked. Although similar in placement and function to the deep seam allowances of the tailored pants discussed earlier (See Chapter 3), the centre back seam allowance of the skirt is not immediately visible from the interior of the skirt because it is concealed behind a lining. To draw attention to where to open the yoke seam to reveal the adjustable seam, the stitching has been made in a complementary contrast colour (Figure 4.11). While this goes some way to signalling the capacity of the garment for alteration, it likely speaks only to those wearers who know to look for it or understand how to read it when they notice it. These reflections informed the development of a more explicit method of labelling to support the dissemination of design and construction features, what they mean, and to connect to resources to help build competency and confidence for future wearers to fully engage with the designer’s vision for the extended life of the garment artefact they have designed (see Chapter 5).

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399. Fry, *Design futuring: sustainability, ethics, and new practice*.



## 4.6 THE COAT

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FIGURE 4.12A. BOUCLE KNIT WOOL COAT  
FRONT



FIGURE 4.12B. BOUCLE KNIT WOOL COAT  
BACK



FIGURE 4.12C. SILK COAT FRONT



FIGURE 4.12D. SILK COAT BACK

#### 4.6.1 THE DESIGN BRIEF: METHODS OF HOME MANUFACTURE

*The Coat* was developed to further explore tailoring techniques by examining design and construction methods to facilitate alterations to the width of the body and the length of the sleeve. Within a womenswear wardrobe, a coat is generally an expensive garment, considered an 'investment piece', promising several seasons of protection from the elements. It is usually purchased with the expectation that it can be worn with most of the existing wardrobe and with future acquisitions.<sup>400</sup> Coat design tends to favour 'classic' shapes and colours, that give traditional garments like the trench coat an association with 'timelessness'.

The intention was to develop a simple coat for the shape library with the required technical mechanisms for resizing included. In addition to this, *The Coat* was identified as an opportunity to reconsider how a garment might be designed for home manufacture and what basic competencies would a home sewer need to possess to take on *The Coat* project. To extend on the findings of *The Cowl Dress*, the approach taken to *The Coat* was to explore if the garment type might be designed to be made in two ways, a simple method, and a more complex method. The simple method might result in a neat, functional garment using few processes and limited machinery (Figure 4.12a,b). The complex method would require greater knowledge of sewing techniques and greater skill in executing the construction, to produce a garment with a higher quality finish (Figure 4.12c,d).

Civilian uniforms are a recurring source of design inspiration. The shape of *The Coat* was informed by the white duster worn by scientists and technicians while working in a laboratory. The 'lab coat' (Figure 4.13) features a straight comfortable cut, one-piece collar, centre-front button (or snap) closure, in-seam pockets and a patch pocket on the chest. *The Coat* retains all these features, with the exception of the breast pocket. Adapted for women's outer wear, *The Coat* has been designed to be unlined, except for the sleeves where the lining supports the cuff and ensures the coat is easily slipped on and off over other garments.



FIGURE 4.13. A LAB COAT WAS THE INSPIRATION FOR THE COAT PROTOTYPE.

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400. In a UK study, the active life of a coat was found to be more than 5 years. Langley, Durkacz, and Tanase, *Clothing Longevity and Measuring Active Use.*, p.5



FIGURE 4.14. INTERIOR DETAIL VIEW OF AN IN-SEAM POCKET BAG SET INTO THE EDGE OF SEAM ALLOWANCE IN A JERSEY DRESS



FIGURE 4.15. INTERIOR DETAIL VIEW OF THE COAT SHOWING POSITION OF THE IN-SEAM POCKET BAG WITHIN THE SEAM ALLOWANCE, PERMITTING FUTURE ALTERATIONS

#### 4.6.2 PROTOTYPE DEVELOPMENT

The drafted pattern for *The Coat* focused on the development of a side seam inclusive of in-seam pockets, that also has the capacity for later alteration. This combination I considered important to coat within the shape library, providing discreet practicality and long-term use to any garments derived from the style. Usually, the inclusion of a pocket in a side seam prohibits alteration of the seam. Figures 4.14 and 4.15 show the difference in construction between a side seam pocket in a vintage dress and in *The Coat* prototype. The sleeve of *The Coat* is drafted with provision for the sleeve to be let down or taken up by adjusting a seam in the lining (Figure 4.16). A shield is attached to the underarm, reinforcing an area of likely wear. On reflection it was noted that unlike *The Cowl Skirt*, *The Coat* required little adaptation of existing tailoring methods to meet the aims of the exercise. This led to the observation that there are historic methods of construction that might simply be re-employed in new contexts of fashion design for sustainability thus opening up a vast and rich library of design that could be redeployed to develop more sustain-able contemporary fashion outcomes. The reintroduction of the reinforcement shield is an example of this (Figure 4.17). In high-quality, men's tailored garments, shields are added to the underarm of jackets and coats and in the seat of trousers, primarily to protect against damage from perspiration (see Chapter 3). Men's trousers may also have a heel stay to protect where the cuff rubs the heel (Figure 4.18). Traditionally in womenswear, reinforcement is used more sparingly, mostly in blazers, but sometimes in dresses and blouses also.



FIGURE 4.16. INTERIOR DETAIL OF A GREY WOOL TOILE FOR THE COAT PROTOTYPE SHOWING SEAM IN THE LINING THAT ALLOWS FOR ALTERATIONS IN THE LENGTH OF THE SLEEVE.



FIGURE 4.17. INTERIOR DETAIL VIEW OF THE COAT SHOWING UNDERARM SHIELD ATTACHED INTO THE UNDERARM SEAM.

Underarm shields are made in one of two general ways: as a separate component tacked on to the garment over the seam junction of the underarm or inserted into the armhole seam during construction.<sup>401</sup> When tacked onto the garment, they can be easily removed, washed, and replaced (Figure 4.19). Shielding areas of wear in these ways is an obvious method of increasing the durability of garments that might be simply reintroduced in to garment manufacturing.



FIGURE 4.18. INTERIOR DETAIL OF THE CUFF OF A PAIR OF MEN'S TROUSERS, SHOWING THE TAPE ALONG THE HEM ALLOWANCE TO PROTECT THE CUFF FROM RUBBING ON THE HEEL OF THE SHOE.



FIGURE 4.19. HOME SEWN DRESS FROM THE 1980S FEATURING UNDERARM SHIELD

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401. Phyllis W. Schwebke, *How to Tailor: A handbook for home tailoring*, revised ed. (Milwaukee: The Bruce Publishing Company, 1965).



The value of the coat as a wardrobe essential warranted the development of two prototypes, each constructed from different fabrics and using different finishing techniques. A black, boucle, woollen fabric of knit construction was cut and constructed using straight stitching and overlocking to neaten the edges. This method uses an overlocker in addition to a sewing machine but requires only basic operations of each. A second prototype was made from a raw silk, woven cloth. It was constructed entirely on a sewing machine, using binding to neaten the exposed interior seams. Binding requires greater skill in sewing and is time consuming to complete, but results in a very neat, durable, interior finish to an unlined garment.

The style made up well in both woven and knitted cloth; the shape did not rely on the stretch capability of the boucle wool, nor did it compromise the shape. Constructing the garment through two different methods, highlighted the contradiction that can exist between skill and machinery: bound seams reduce the machinery needed to make the garment, but require greater skill to execute successfully. Industrial manufacturing processes were invented precisely to reduce the difficulty, time and cost taken to produce garments. In proposing to reintroduce construction methods that have been superseded by mass-manufacturing technology (e.g. overlocking replacing a bound seam), due consideration needs to be given to the feasibility of reverting to past techniques. Fry discusses a re-conceptualisation of past technologies to ensure the suitability of such methods to the modern day.<sup>402</sup> For example, possibly there are new types of press stud fastenings that might be developed to better suit the goals of sustain-ability; ones that are quick to apply but easy to remove without damaging the garment. Alternatively, a trade-off may be required: that sewing press studs takes longer than inserting a zip, is a necessity of sustain-ability. Just as paying a living wage (and consequently a higher retail price) is a necessity of ethical garment production.

#### 4.6.3 EVALUATION OF THE PROTOTYPE COAT – GARMENT LIFETIMES

*The Coat* was a successful exercise and generated a simple coat for entry in the shape library to be used by designers to develop different coat styles. While making *The Coat*, reflection on the place of a coat within a personal wardrobe drew attention to the coat garment type already possessing many of the qualities that this research project seeks to embed in other garment types. Some will argue that a coat is already an enduring garment and could have been excluded as a prototype in this study. However, *The Coat* is also relatively straight forward to produce and therefore is interesting from this perspective related to the question of how to produce sustain-able design rather than what is sustainable fashion. The economic and practical value of a coat can also be seen as a possible motivator for home manufacture. A coat might be perceived as a more worthwhile project than other garment types, in that the time spent making the coat will be offset by long-term use and the cost saving of making it yourself. Similarly, the economic and practical value of a coat might be a stronger motivation for subsequent actions of re-modelling by future wearers.

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402. Fry, *Design futuring: sustainability, ethics, and new practice*.

## 4.7 THE CULOTTES

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FIGURE 4.20. THE CULOTTES WITH THE LAYERED TOP



FIGURE 4.21. THE CULOTTES FEATURE THE SAME ADJUSTABLE WAIT CLOSURE AS THE COWL SKIRT.

#### 4.7.1 THE DESIGN BRIEF (INSTRUCTIONS FOR HOME MANUFACTURE)

Within the shape library, *The Culottes* hang between *The Cowl Skirt* and *The Trousers*, an essential half-way point in adapting the adjustable, fitted, waist closure from a loose-fitting skirt shape to a close-fitting trouser shape (Figures 4.20 and 4.21). At the conclusion of the study, these three prototypes prove the suitability of the mechanism developed to wide range of tailored, lower-body garments. In addition, *The Culottes* continued the investigation of designing for home manufacture. Whereas *The Coat* had investigated different methods of home construction (simple and complex), *The Culottes* focused on developing a method of instruction for home manufacture. A digital pattern of *The Culottes* accompanied by assembly instructions was created for download from a website as a PDF file. These were given to a participant to test their effectiveness.

The aim was to investigate the expanded design process required to produce a garment and the supporting resources for self-directed home assembly. The experiment sought to resolve whether this study should pursue the design of garments for home manufacture as a key outcome. Encouraged by the rapid progression in competency experienced by the undergraduate fashion students I teach, the potential of scaffolding garment interactions of re-modelling to culminate in wearers to attempting to make a garment was appealing. However, the experience of making up the Sans jacket digital pattern had hinted that developing garments for home manufacture was not likely to be an easy addition to an existing ready-to-wear garment design process (see Chapter 3).

*The Culottes* prototype experiment focused on the production of the supporting resources to enable self-directed construction by a competent home sewer. *The Culottes* style is a variation of *The Cowl Skirt*, in which the cowls are omitted and the skirt panels are replaced with wide, low-crotch legs. *The Culottes* are not lined, which required some amendment of the construction of the waist closure and resulted in a simplified pattern. The pattern pieces were digitised using Gerber AccuMark software and imported into Adobe Illustrator where they were developed into diagrams and published as PDF files, printable at A4 size. The home sewer tapes the pages together and cuts out the pattern (Figure 4.22). A set of step-by-step instructions with photos was generated by documenting the construction of a sample garment.

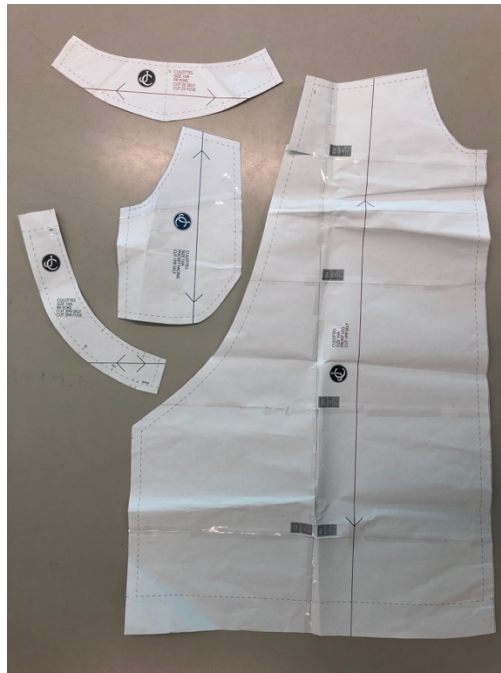


FIGURE 4.22. THE CULOTTES PATTERN IS ASSEMBLED FROM PRINTED PAGES, TAPED TOGETHER.

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#### 4.7.2 PROTOTYPE DEVELOPMENT

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While it was straight forward in principle to create these resources, it was time consuming in practice and significantly prolonged the garment design development process. In mass manufacture, industry shorthand and the known expertise of the manufacturers streamlines the production of the pattern and the order of work (construction instructions). In contrast, the instructions and pattern required for a garment designed for home manufacture needs to account for wide variables in the skill of the person making the garment, potentially teaching them how to do each step, not merely listing the steps to be done. It is reasonable to assume that novice sewers will need more guidance than advanced sewers in basic construction processes (like cutting fabric or sewing a button). This depth of instruction is more akin to teaching than the specifications of manufacture. Generating these resources required proficiency in technical skills and software programs peripheral to my typical fashion design process: photography and the software programs Gerber AccuMark and Adobe Illustrator. The digital pattern generation was outsourced but I took my own amateur photographs for the instructions.

The PDF pattern files were sent to a competent home sewer who was asked to select appropriate fabrics (self, lining and interlining), cut and construct the garment. This experiment repeated that of *The Cowl Dress*, testing how readily the style can be made up at home, as an alternative to buying it ready-made. It extended on that experiment by testing the digital resources produced to guide the garment's manufacture. The participant kept a journal of the manufacturing experience, noting the time taken, degree of difficulty in undertaking the task, and reflecting on suitability of the instructions provided. After taking one hour and twenty minutes to assemble the pattern and cut out of their chosen

fabric, and a further one hour and thirty minutes on constructing the garment, the test participant made a mistake while constructing the front yoke and pocket, attaching the lining inside out. Given the work involved in unpicking the garment to correct the error, she abandoned the garment. The failed experiment reveals that despite the provision of explicit construction instructions, successful comprehension by the sewer cannot be guaranteed. At this point, I speculated that video instructions might prove more successful by better replicating a teaching experience.

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### 4.7.3 EVALUATION OF THE PROTOTYPE

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The experience of producing *The Culottes* as a digital resource validated the concerns raised by the earlier Sans jacket investigation (see Chapter 3). The generation of instructional resources necessitates an extended, labour-intensive garment production process, requiring additional skills and knowledge. While this process can be systematised for efficiency, each new garment style produced requires unique supporting information. In the context of a commercial fashion business producing seasonal collections, developing these types of resources would greatly increase the cost of each garment. At the conclusion of *The Culottes* experiment, the research aim to produce garments that can both be made and re-made at home was finally determined to be an important observation for future research but beyond the scope of this study. While sophisticated examples exist of garments designed for home manufacture (discussed below), examples of contemporary ready-to-wear womenswear garments produced with provisions to be later re-modelled are hard to find. In the context of emerging literature of clothing usage and disposal<sup>403</sup> which indicates the benefits of prolonging clothing use,<sup>404</sup> re-manufacture was decided upon as the strategy most likely to have impact on the issue of preventing premature disposal of fashion garments. Further, as an extension of the existing conventional fashion design and production process, design for future re-modelling would be potentially easier to implement than design for home manufacture.

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403. Goworek et al., "Consumers' attitudes towards sustainable fashion: Clothing usage and disposal.", Laitala and Klepp, "Clothing disposal habits and consequences for life cycle assessment (LCA).", WRAP, *Valuing Our Clothes: the true cost of how we design, use and dispose of clothing in the UK*.

404. Laitala, "Making Clothing Last: A Design Approach for Reducing the Environmental Impacts.", Fisher, James, and Maddox, *Benefits of re-use case study: clothing*

#### 4.7.4 ONLINE GARMENT PATTERN SERVICES AND HOME SEWING COMMUNITIES

Since the commencement of this research project, there has been a proliferation of websites providing digital patterns for home assembly, in addition to some of the earlier sites set up as home sewer communities. These services are increasingly sophisticated, maximising the capabilities of collaborative web technologies to offer pattern customisation and to grow a community of users who share their projects and contribute ideas. Websites like The Fold Line offer home sewers a database of digital patterns that can be searched according to a range of parameters, including body size and shape, fabric type and degree of difficulty. Alongside this database they provide resources for improving sewing skills, a blog and a user forum for members. Community members are invited to post reviews of patterns and even to meet up in person via conversations in their forum.<sup>405</sup> A weekly Friday mail out to this community cheerfully encourages participation by suggesting sewing projects for the coming weekend (Figure 4.23.).

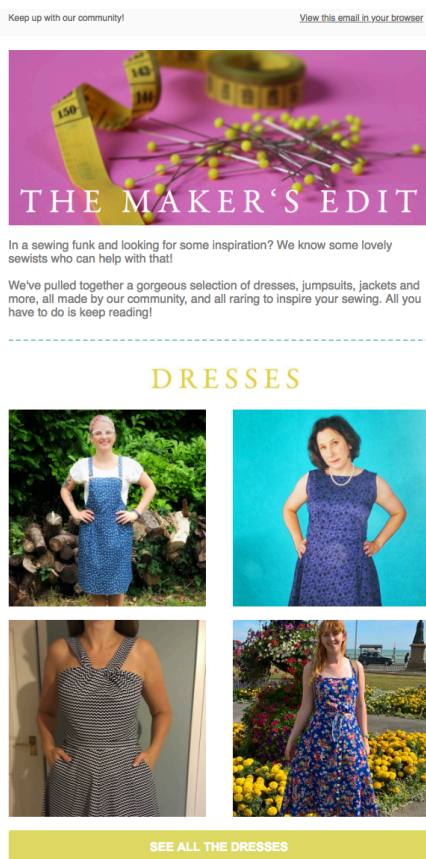


FIGURE 4.23. EXAMPLE OF A WEEKLY FRIDAY EMAIL FROM THE FOLDLINE

405. The Fold Line, "Sewing Community," 2015, accessed November 10, 2018, <https://thefoldline.com/join-the-community/>.



Home sewers might also access Bootstrap Fashion that provides a customisable pattern development service, although it is primarily pitched at micro, small and new fashion businesses. In addition to custom-fit sewing patterns, an original garment style can be 'designed' using an online tool by combining garment components selected from an extensive database of necklines, sleeve shapes and so on (Figure 4.24). The resulting pattern, adapted to fit to the client's specified body measurements, is emailed within half an hour and can be used for home manufacture or mass production.<sup>406</sup>

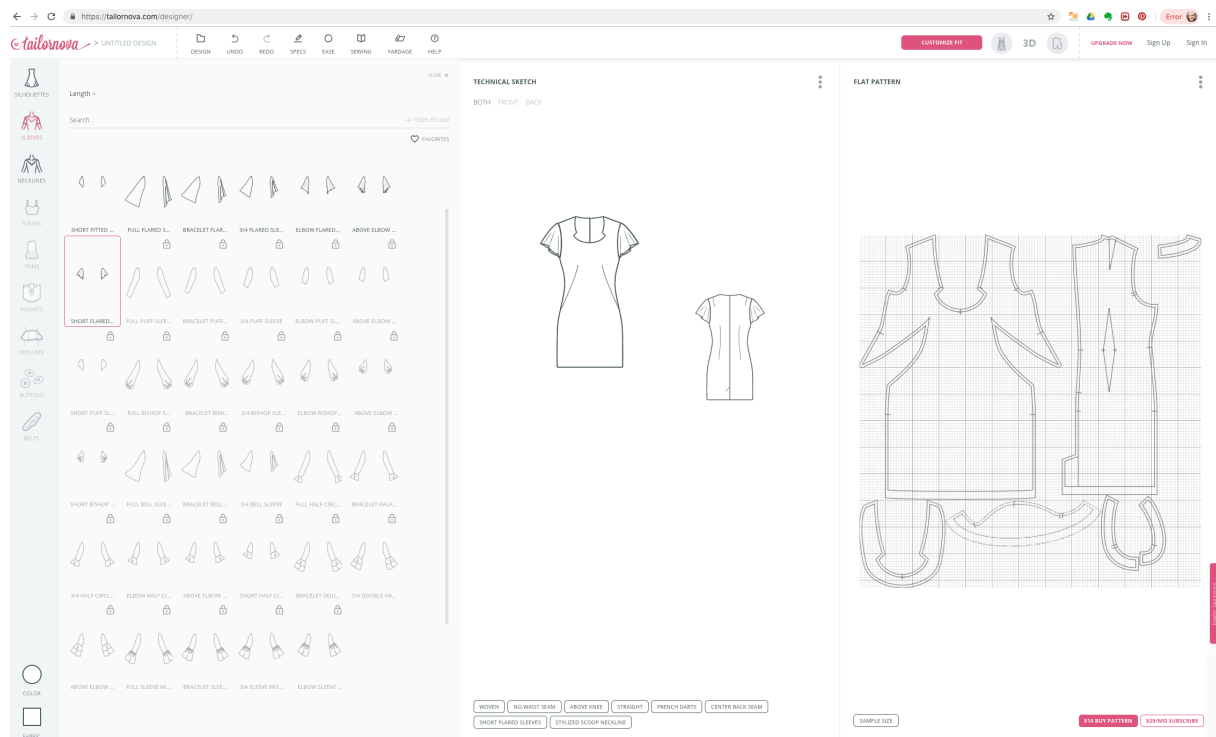


FIGURE 4.24. SCREENSHOT OF TAILORNOVA CUSTOMISABLE PATTERN GENERATION SERVICE BY BOOTSTRAP FASHION.

The full ramifications of this type of service is yet to be realised in either the professional or amateur markets. Provided the desired design features can be created through the tool, this service dramatically simplifies the conventional process of developing garment patterns through either manual or computer-aided pattern making, whether in-house or outsourced. The availability of this service online, gives the public access to what was previously a costly business-to-business service. Significantly for the home sewer, a customisable pattern removes the need to (inexpertly) adapt a standard-sized pattern to fit the individual figure, a frequent cause of frustration and disappointment in home sewing.<sup>407</sup>

406. Mylinego Inc., "Bootstrap Fashion," accessed July 4, 2018, <https://bootstrapfashion.com/>.

407. With which I am all too familiar!



## 4.8 THE LAYERED TOP

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FIGURE 4.25. THE LAYERED TOP COMPRISING THREE PARTS: BLACK SAMPLE, SIMPLE SLEEVE STYLE, WORN WITH THE COWL SKIRT.

#### 4.8.1 THE DESIGN BRIEF: MODULARITY AS A STRATEGY FOR FASHION DESIGN FOR SUSTAINABILITY

To complement the concise collection of garment shapes within the shape library for *The Living Wardrobe* that so far comprised *The Cowl Dress*, *The Cowl Skirt*, *The Culottes*, and *The Coat*, a top was prototyped (Figure 4.25). Designing a top was an opportunity to test on an upper body garment, the design for longevity principles and methods so far developed on lower body garments. Further, it was an opportunity to transpose those principles and methods from garments made from woven fabrics to a garment made from a knit fabric. Cut and sew<sup>408</sup> knit garments feature prominently in contemporary, everyday womenswear. Therefore, I considered it imperative to test on garments of knit construction, the suitability of the techniques so far developed, to ensure that the methods proposed can be readily adopted by designers and wearers for a range of garment applications. Knit fabrics introduce additional considerations in designing garments for extended wear. Knit garments are cut from fabrics that have either one-way or two-way stretch,<sup>409</sup> joined with multi-thread chain stitching that creates flexible seams to stretch with the fabric. Knit garments can be pulled on and off easily, often without the need for openings and fastenings. Because they stretch to fit, knit garments are comfortable and accommodate some fluctuation in body size. These qualities make them popular with designers and wearers alike. Knit garments feature in all categories of fashion, particularly in the ‘basics’ category of foundation garments or base layers, designed to be worn regularly, in combination with more fashionable garments.

My experience of wearing knit garments lead me to speculate that an enduring knit garment would likely be one that withstood frequent wear and facilitated repair. Given their forgiving fit, it is likely less that during extended use, knit garments would need to be altered to accommodate changing body size. Design for the future repair of knit garments is hampered by the narrow, densely stitched seams that are time consuming to unpick and difficult to replicate using domestic sewing machinery. Therefore, the traditional tailoring methods investigated through the previous prototypes would be not readily transferrable to garments of knit fabrics. An alternative interpretation of these principles was required appropriate to garments that through their very construction, prohibit intervention. This led to an investigation of modular design.

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408. “Cut and sew” knit garments are distinct from “fully-fashioned” knit garments. Cut and sew garments are constructed from garment pieces cut from a knitted cloth, while fully-fashioned knit garments are knitted to shape.

409. One-way stretch facilitates stretch around the body, while two-way stretch stretches around and up and down the body, as required by swimwear, for example.

## 4.8.1.1 MODULAR DESIGN

Modular design is an established approach to design for sustainability, particularly popular in product design.<sup>410</sup> In a modular design, products are assembled from component units and can be readily taken apart. Modular design supports extended use by enabling products to be reconfigured into different formations appropriate to different circumstances, to be updated with new components and for worn parts to be replaced. At the end of life, modularity assists disassembly for recycling. In this study, a modular garment design suggests a complementary method of embedding durability into garments if components can be replaced when tastes change or garment parts become damaged. Citing an example of a seventeenth century bodice with tie-on sleeves, Gwilt points out that this is not a new concept in clothing and warrants re-examination for its sustaining potential.<sup>411</sup>



FIGURE 4.26. MODULAR  
GARMENT DESIGN BY  
RHIANNON HUNT



FIGURE 4.27. MODULAR  
GARMENT DESIGN BY  
FLAVIA LA ROCCA



FIGURE 4.28. MODULAR GARMENT  
DESIGN BY CAROLIN VOGLER ©

Contemporary designers exploring modularity as a design strategy for sustainable fashion take different approaches. Rhiannon Hunt and Flavia La Rocca both aim to increase garment use by creating garments with interchangeable parts. The wearer is able to combine components into a look that best suits their immediate needs. Garments that are more adaptable to changing weather and social occasions have the potential to be used more frequently. In 2015, Hunt won the Sustainable Clothing Action Plan's "Extending the Life of Clothes" award, for a collection of modular clothing that comprises tailored foundation garments to which further elements can be attached with a snap fastener to adjust the look and fit (Figure 4.26). Hunt believes that an increase in functionality and frequency of garment

410. The Aeron office chair by Herman Miller is a famous example. It can be completely disassembled into component parts for recycling.

411. Gwilt, "Valuing the Role of the Wearer in the Creation of Sustainable Fashion.", p.82

use through modularity is a way of fostering enduring subject-object relationships between wearers and their garments.<sup>412</sup>

Flavia La Rocca also produces convertible garments that achieve modularity through hidden zips, ties and other fastenings that permit components to be attached and detached to change sleeves and hemlines and to provide variations in style and details (Figure 4.27). La Rocca cites her concept as “modular collections to create a never ending wardrobe.”<sup>413</sup> By increasing the functionality of each piece, La Rocca proposes modular clothing can reduce the overall number of garments within a wardrobe. An alternative approach to modularity has been explored by designer Carolin Vogler.<sup>414</sup> Vogler breaks the garment surface down into a single, repeated, triangular shape. Laser-cut in felt from a CAD file in quantity, the pieces interlock to create a textile that can be shaped into garment form by the wearer directly on their body (Figure 4.28). Vogler details her production process online and has published her CAD files for anyone to download and use.<sup>415</sup> This project is a tantalising glimpse into the capacity of digital technology to invent new garment making processes with great potential for increasing the sustain-ability of fashion garments.

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## 4.8.2 PROTOTYPING THE MODULAR TOP

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In this study, principles of modularity are applied in two ways. Like Hunt and La Rocca, garment components are designed as modules to be interchanged easily during wear. Interchanging parts requires no sewing skills of the wearer. This approach seeks to support frequent use and to meet more wardrobe needs with fewer garments. To facilitate later disassembly and reassembly as may be required for repair, each module within the garment is designed and constructed to enable intervention using the simplest (de-)construction methods possible. To maximise the opportunities for investigation through this foundational shape within the shape library, the style of the top prototype was initially a simple design: a close-fitting body with a modest round neckline, a shaped, hip-length hemline that might be tucked in or worn out, and long sleeves. Each of these style features became a site of experimentation with principles of modularity throughout the prototyping process.

Two different prototype designs were developed for this top, one following the other. Both prototypes segment the garment into component parts: body, sleeves and collar, and investigate how these components might be developed as separate modules that combine to complete a garment. The first iteration approached modularity by developing detachable sleeves for a singlet body that convert it to a long sleeve top and allow for the interchange of different sleeve styles (an alternative sleeve style has also been developed). (Figures 4.29 and 4.30). The second iteration of the prototype pursued the same

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412. Ecouterre, “Can Modular Design Teach Us to Love Our Clothes Longer?,” 5 November, 2015, accessed July 14, 2018, <https://inhabitat.com/ecouterre/designer-rhiannon-hunt-wants-to-combat-fast-fashion-with-modular-design/>

413. Flavia La Rocca, “Flavia La Rocca,” accessed July 14, 2018, <http://flavialarocca.com>.

414. Caroline Vogler, “Modular Fashion,” October 19, 2017, accessed July 14, 2018, <https://medium.com/@CarolinVogler/modular-fashion-c98306c820a9>.

415. Caroline Vogler, “Shark Tooth Module,” Open Source Circular Fashion, 2 November 2017, accessed July 14, 2018, [https://oscircularfashion.herokuapp.com/project/-KxsHEQbWoLHY4\\_vVWj-](https://oscircularfashion.herokuapp.com/project/-KxsHEQbWoLHY4_vVWj-).

aim through a simpler method of layering garments: a singlet, bolero cardigan and collar that can be worn together or separately (Figure 4.31). In this iteration, each module is a complete, resolved garment, and might be worn with other items in the wardrobe, therefore increasing its use.



FIGURE 4.29. THE LAYERED TOP #1: A MODULAR TOP WITH DETACHABLE SLEEVES



FIGURE 4.30. THE LAYERED TOP #1: THE MODULAR TOP BECOMES A SINGLET WHEN THE SLEEVES ARE REMOVED.



FIGURE 4.31. THE LAYERED TOP #2 IN CREAM: THE SINGLET AND BOLERO SLEEVE CARDIGAN ARE SEPARATE GARMENTS.

The challenge of resolving this design was ensuring its success in form and function as both a long sleeve top and also a singlet without sleeves. This is the particular challenge of designing modular garments, that they need to be aesthetically resolved in all configurations, that is, to look as good with the sleeves detached as attached. Two approaches to this were considered: either treat the technical mechanism that facilitates modularity as an aesthetic element within the garment as does Hunt,<sup>416</sup> or conceal it within the garment's design, as does La Rocca.<sup>417</sup> Given the established aims of the study to use materials and methods accessible to home sewers, the later approach was adopted as it would enable home sewers to replace any part of the modular mechanism.

In the first prototype style (iteration #1), large sew-in press studs are used to secure the sleeves to the singlet body. These are concealed under a contrast band set into the shoulder yoke (Figure 4.32). When the sleeves are detached, the unused press studs are not visible. Several toiles were required to resolve the yoke/armhole design and construction, as it comprises multiple intersecting pieces. While the fit and look of prototype iteration #1 was acceptable, the snap fastening mechanism of the yoke

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416. Hunt has created and 3-D printed a snap fastener that sits visibly on her garments. Ecouterre, "Can Modular Design Teach Us to Love Our Clothes Longer?."

417. La Rocca conceals zips and other closures within the design lines of each garment. La Rocca, "Flavia La Rocca."



design was complex and would be costly to produce. I perceived this to be a barrier to adoption of the method by other designers, and also a barrier to wearers attempting future alterations. As an inclusion in the shape library, for *The Living Wardrobe*, it would dictate a (potentially undesirable) shoulder yoke and band feature in any subsequent style developed.



FIGURE 4.32. TOILE FOR *THE LAYERED TOP* #1: DETACHABLE SLEEVE HEAD DETAIL. THE SLEEVE IS SECURED UNDER A BAND IN THE SHOULDER YOKE WITH PRESS STUDS.

The shift from iteration #1 to iteration #2 was a result of what Schön describes as the “situation’s back-talk” characteristic of a “good process of design”, employing reflection-in-action.<sup>418</sup> Reflecting on the processes and outcomes of iteration #1 of the modular prototype top, led to cycling back to the aims of the experiment and a reassessment of how they might be met through simpler means. Was there an easier way to design an enduring, modular, upper body garment, appropriate to knit fabrics? Revisiting the role of knit garments within the wardrobe as co-ordinating pieces to be layered with other garments, suggested a potential new approach: to reconceptualise existing ideas of the tailored suit and the twin set within one garment form. Worn together to complete an outfit, a tailored suit or twin set comprise two or three garments designed to be worn as an ensemble.<sup>419</sup> However it is usual for men to have more than one pair of trousers within a suit and for women to wear different blouses with

418. Schön, *The reflective practitioner: how professionals think in action*, p.79

419. A tailored suit comprises a jacket and trousers with optional waist coat, a twin set comprises a jacket with either a skirt or trousers.



their twin set. Adapting this logic, the garment modules within *The Layered Top* are conceived as entirely separate components that might be styled together as one would an outfit.

Resolving the design and manufacture of a singlet, a bolero cardigan and complementary collar was relatively straight forward. In contrast to the complexity of the modular mechanisms of the first prototype for the top (iteration #1), the simplicity of approaching the challenge of modular fashion through the assembly of garment components, I deemed to be immediately successful. It is therefore a more suitable inclusion for the shape library as it offers an easy way for designers to create modular garments and for wearers to interact with them on a daily basis. To test how a shape within the shape library can be used to create subsequent fashionable garment styles, a style variation of the bolero cardigan within *The Layered Top* was developed from the basic bolero cardigan shape. Using the simple straight sleeve pattern first created, a full sleeve with a gathered, tab shoulder design was produced. Swapping the plain sleeve for the fancy sleeve is an example of how a modular garment can offer variety in everyday wear, updating the look of the overall ensemble by changing one component within (Figure 4.25 and Figure 4.31).

#### 4.8.2.1 MODULAR GARMENT DESIGN FOR REPAIR

At the same time as resolving modularity for the daily interchange of parts, modularity to facilitate repair was explored through both iterations of the modular top. Modularity potentially overcomes the need for repair if worn garment parts can be swapped for new ones. To prevent the discard of large garment modules (sleeves or a singlet body) the potential was investigated for these components to be modular also, thus enabling the repair of a sleeve cuff, for example. I had noted through personal experience that the hem and the cuffs of knit garments are particularly susceptible to wear (dirt and holes). Therefore, instead of the typical folded, cover-stitched allowance, the cuffs of the sleeves and the hem of the body are designed as wide bands, cut from a contrast fabric and seamed into place (Figure 4.33). When damaged or stained, the bands can be cut off and replaced with new parts made in a complementary fabric. This potentially assists with repairs as an alternative to building in extra fabric (see Table 4.2) when an exact fabric match for the body of the garment need not be found. Instead, any fabric that the wearer thinks suits the body of the garment can be used. Since the original garment included contrasting fabric, the look of the garment need not be dramatically affected by the repair. In fact, it presents an opportunity to update and refresh the look of the garment, as had the re-modelling of the velvet wrap skirt in a previous investigation (see Chapter 3).

This finding is a further example of how past practices of garment maintenance might be reintroduced into contemporary fashion design for sustain-ability. At the time *Practical Home Mending Made Easy* was published (1946), it was common practice to repair, resize and re-model garments through the addition of a small piece of new fabric (Figure 3.12). Rather than attempt to match the existing cloth of the garment, a contrast was used to simultaneously repair and refresh the look of the garment. *The Layered Top* pre-empts this type of repair by including contrasting fabrics within the initial design.



FIGURE 4.33. LAYERED TOP #2, BLACK SAMPLE WITH ALTERNATE SLEEVE STYLE, DETAIL OF CUFF AND HEM BAND

#### 4.8.2.2 MODULAR GARMENT DESIGN FOR REINFORCEMENT: UNDERARM SHIELD

Through personal experience of wearing durable, woollen long sleeve tops over several years, I had noted that despite careful laundering, close fitting, knit garments become stained and worn thin under the arm, from perspiration, deodorant and friction. In some woollen knit garments I have owned and worn frequently for more than ten years, this is the only sign of wear on the garment. In part this may be remedied by cutting the armhole lower so it sits further from the armpit. In a modular garment design, the increased ventilation afforded by sleeves separate to the body also assists. This protection might be further extended by the inclusion of an underarm shield to protect the fabric surface. In each iteration of *The Layered Top*, a shield was cut from the same fabric as the garment and stitched in during construction of the armhole to reinforce the underarm of the body (Figure 4.34 and 4.35). This method is an adaptation of the underarm shield traditionally used in the lining of tailored coats and jackets. Once soiled, the shields can be cut out and the garment worn without shields.<sup>420</sup>

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420. With some skill and effort, the shields might be replaced, if the armhole seam is opened and a new shield set in.



FIGURE 4.34. TOILE FOR LAYERED TOP #1 DETAIL: UNDERARM SHIELD. ONCE SOILED, THE SHIELD CAN BE CUT OUT.



FIGURE 4.35. LAYERED TOP #2 DETAIL: UNDERARM SHIELD. A REFINED VERSION THAT BETTER PROTECTS THE UNDERARM EDGE.

The acceptable resolution of an underarm shield that might be easily included in the manufacture of the garment is a significant finding of this prototype, with the potential to double the duration of the garment's use. Although not traditionally found in knitwear garments, transposing the concept of reinforcements from tailoring to knitwear is a further demonstration of how past practices of garment manufacture can be re-purposed for sustain-ability. The reintroduction of an underarms shield into contemporary, conventional manufacture would not present any challenges to manufacturers and go a long way to extending the use of upper body garments.<sup>421</sup>

#### 4.8.2.3 CONSTRUCTION METHODS FOR RE-MODELLING KNIT GARMENTS

In keeping with aims of the study to use materials and methods accessible to home sewers, in place of the several specialist sewing machines typically required to manufacture a garment from knit fabric, the modular top prototypes were constructed using only a domestic overlocker and sewing machine. By limiting the production of the garment to capabilities of these two machines, it was hoped that the garments' seams could be readily recreated at home by a wearer undertaking repairs. A domestic overlocker can replicate exactly an industrially overlocked seam, and a domestic sewing machine features single and twin needle stitches for sewing stretch seams. However, these seams are little easier to unpick than those produced industrially, making the first step of a repair, disassembly, difficult.

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421. It should be noted that shields can also be applied after manufacture by wearers. There exist online DIY tutorials for this. See for example: <http://juxtaposenz.blogspot.com/2014/06/how-to-make-your-own-removable-dress.html> [accessed Nov 24 2018]

Experimentation with the least complex overlocking stitches possible, ended in frustration one day when I cut off the cuff I had been painstakingly unpicking. Not wanting to waste the work, I seamed a new cuff on to the cut edge of the sleeve and despite the loss of 5mm length from the missing seam allowance, the outcome was acceptable. I tested the same approach to the replacement of the hem band on the singlet with similar success. This accidental discovery led me to pursue a method to repairing and re-modelling the modular garment prototypes that avoided the need to unpick any stitching. This approach promised exciting possibilities for the simple replacement of components where cuffs/hems/shields can be cut off and new ones sewn on with relative ease. The cut-off garment components provide a template to trace off a pattern for a replacement part. Placed on to a piece of fabric, they might be pinned down and cut around. However, ensuring an accurate outcome is time consuming and impacted by the condition of the part being traced (if it is stretched and distorted through use or cut off roughly). At this point I hypothesised that it would be beneficial to the wearer if they could access instructions to draft a replacement garment component.

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#### 4.8.3 EVALUATION OF THE LAYERED TOP PROTOTYPE

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The development of a modular upper body garment through to the resolved Layered Top #2 prototype, was a particularly rich practice research experiment. It tested how modular design might be employed in fashion to facilitate durable garment lifetimes through the daily interchange of garment parts and through the replacement of parts for repair and re-modelling. In addition to the creation of a successful garment shape for the library, key realisations were made about methods of wearer interactions with the garment in carrying out future alterations. Simplified processes of construction were used to enable future alteration at home and easy methods were developed for those home alterations. Despite the effort made to construct the garment with stitches that a home sewer might later exactly replicate (e.g. match industrial stitch types to domestic ones), while working through the last samples of iteration #1 of the modular top, I realised this was not strictly necessary. Provided the garment has capacity for the wearer to intervene, they can do so with whatever equipment is at hand, to achieve an outcome with which they are content.<sup>422</sup> This might be to re-make the garment as accurately as possible or it might be to expend minimal effort to maintain the garment's functionality. What is important, is that the garment facilitates such intervention. This was an exciting realisation, again raising the importance of making the futuring potential of the garment visible to the wearer within the garment, to encourage such interactions.

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422. This finding is reiterated by Salvia and Cooper, in their article, *The Role of Design As A Catalyst for Sustainable DIY*, "Perceived satisfaction gained in the DIY practice appears to be the crucial factor motivating pursuance and accomplishment of the task, regardless of the level of the individual's commitment and ability." Salvia And Cooper use the term RE-DIY to describe DIY actives of re-using repairing, repurposing, re-appropriating to prolong product life, stating, "There is a growing and diverse population applying the DIY approach to the replication, repair, regeneration, re-design, or refunctionalization of products." Giuseppe Salvia and Tim Cooper, "The Role of Design as a Catalyst for Sustainable DIY," in *Sustainable consumption : design, innovation and practice*, ed. Audley editor Genus (Switzerland: Springer, 2016)., p.17-18

## 4.9 THE TROUSERS

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FIGURE 4.36. THE TROUSERS ARE MADE WITH THE SAME WAIST CLOSURE AS THE SKIRT AND CULOTTES



#### 4.9.1 DESIGN BRIEF: COMPLETING THE SHAPE LIBRARY

The straight leg trousers complete the suite of everyday garment shapes produced within the shape library and conclude the practice research experiments within the study (Figure 4.36). *The Trousers* investigate the suitability of the same adjustable waist closure developed on *The Cowl Skirt* and refined on *The Culottes*, to a close-fitting trouser. The likelihood of home sewers being able to extend the life cycle of their fashion garments would be greatly improved if one technical mechanism were found to be transferable across all garment types that fit at the waistline. Success was not guaranteed since both *The Cowl Skirt* and *The Culottes* feature a loose fit from the hip, which a trouser does not. To test the suitability of the trouser shape as a foundation of the development of fashion styles, a trouser design featuring a deep yoke and a pleat down the outside leg was subsequently produced (Figure 4.37 and Figure 4.38).



FIGURE 4.37. THE TROUSERS, STYLE VARIATION WITH OUTSIDE LEG PLEAT



FIGURE 4.38. THE TROUSERS, STYLE VARIATION WITH OUTSIDE LEG PLEAT: DETAIL OF WIDE WAISTBAND YOKE AND SIDE POCKET OPENING.

## 4.9.2 PROTOTYPE DEVELOPMENT

The trouser was developed by adapting the yoke opening feature of *The Cowl Skirt* and *The Culottes* to a narrow waistband. Following the findings of the historical survey conducted earlier (see Chapter 3), included in the trouser pattern is the allowance for alteration through the centre back seam and areas of wear are reinforced with shields: the seat and the hem of the back leg (Figure 4.39). Prototypes of *The Trousers* were produced from linen and woollen suiting fabrics which when fitted, showed the exercise to have been a success: the same method of replacing a zip with an opening in the pockets that allowed for alteration of a skirt was suited also to trousers.



FIGURE 4.39. THE TROUSERS: INTERIOR BACK SHOWING WIDE CENTRE BACK SEAM ALLOWANCE AND SEAT SHIELD

The final shape in the shape library for *The Living Wardrobe*, *The Trousers* were used as a base from which a fashion style was developed. The waistband closure was translated into a deep yoke and a pleat was introduced into the outside leg. This experiment explored the flexibility of the waist closure mechanism to adapt to style variations. The limitation revealed is the requirement to include a side pocket in the garment design, necessary to conceal the garment opening. While the shape and dimensions of the pocket can be varied, a functional minimal opening is necessary to step in and out of the garment. This limitation applies to *The Trousers* and also *The Cowl Skirt* and *The Culottes*.



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### 4.9.3 EVALUATION OF THE TROUSERS

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*The Trousers* demonstrated the successful application of the adjustable waist closure mechanism to a range of lower body garments, both loose and fitted to the legs. Designers seeking to facilitate extended use through garment design, might take up this one method in the knowledge that is applicable to many garment styles. The limitation of the method is the necessity to include within any design, a side pocket into which the garment opening is incorporated. This might be barrier to its use in some garment designs where a pocket is not desired. The adjustable waist closure mechanism resolved through this study is one solution to the challenge of designing fitted garments that can accommodate future changes in size, appropriate to many garment types and styles. It is an aspiration of the research study that other fashion designers might adopt the principles within the thesis and following the examples provided, develop further methods of designing garments for *The Living Wardrobe*.

## 4.10 CHAPTER CONCLUSION

*"...the practical aim is to design materials and tools that make sense within the specific practice, that is, that are intelligible with what is known and embodied at the time, yet are also capable of not only supporting the actions of practice but allow for change of the practice itself."*

- Ron Wakkary and colleagues<sup>423</sup>

Through iterative cycles of practice research, a series of garment prototypes have been developed, that both form and embody the foundations of a 'living' wardrobe. It is through this research process that the concept of 'living' garments, informed by the principle of design for extended use, are imbued with the practical capacity to withstand long-term wear by sequential owners because the garments designed are modular, employ simple construction methods, and seek to facilitate repair and re-modelling to maintain condition and fashion currency until disassembly for recycling (or composting).

As the series was developed, the methods of design for extended use being formulated were tested and refined on a range of typical lower body and upper body garments. The transition from one garment type to another, necessitated changes to usual industrial patternmaking and construction methods in consideration of fit and fabric requirements typical to those garment types. The outcome is a foundation range of garment "shapes"<sup>424</sup> from which fashion styles can be developed. The resolved prototype for each style seeks to demonstrate that the design of living garments need not result in garments that look substantially different from the prevalent taste. Rather, sustain-ability can be incorporated into contemporary, conventional women's daywear design. Aesthetic similarity to conventional fashion is potentially a significant method of making sustain-able fashion practices more accessible. In this case, the sustain-able garments look familiar, but enable practices of extended garment wear and care as a result of a design process connected to the use phase of the garment life cycle. This goes some way to making practices of sustainable fashion easy to adopt, if wearers are not expected to substantially change their look to suit their ethics.

The experiments have revealed the critical role the garment artefact might play in the transition from fast, disposable fashion to creating enduring, sustain-able fashion artefacts. A summary of the key findings of each of the prototype experiments is presented in Table 4.6. These findings support and extend on the existing literature in that they are a combination of ways of practicing fashion design for sustain-ability and utilising alternate, sometimes forgotten, production methods to create clothing-fashion artefacts that are inherently sustain-able. The outcomes are both theoretical and practical and confirm the benefits of adopting practice as a key method of research in this study.

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423. Ron Wakkary et al., "A sustainable design fiction: Green practices," *ACM Trans. Comput.-Hum. Interact.* 20, no. 4 (2013), <https://doi.org/10.1145/2494265>

424. Rissanen, "Zero-waste fashion design: a study at the intersection of cloth, fashion design and pattern cutting."

Style	Key Findings
<i>The Cowl Dress</i>	<p>A range of garment interactions can be scaffolded within one garment style to facilitate the varying capabilities of wearers to re-model a garment.</p> <p>The capabilities of the wearer significantly impact the success of re-modelling actions undertaken.</p>
<i>The Cowl Skirt</i>	<p>Garment details can signify the futuring capacities of garments to those with the literacy to read them</p> <p>More explicit signalling is needed for those without the literacy.</p>
<i>The Coat</i>	<p>There are historic techniques of garment design and construction for longevity that can be reintroduced to contemporary garment manufacture without adaptation.</p> <p>Further methods would benefit from reconceptualisation in the modern context.</p> <p>Alternatively, fashion design for sustain-ability requires some compromise on methods</p>
<i>The Culottes</i>	<p>A garment style produced for home manufacture requires extensive instructional resources. Home manufacture of garments well catered for in the market by companies like McCalls. In contrast, garments designed for extended use and re-use are under-represented in the market.</p>
<i>The Layered Top</i>	<p>Modularity enables versatility in daily styling and facilitates repair of worn garment components.</p> <p>The same method that repairs the garment can also refresh its look.</p> <p>Repair and re-modelling does not need to exactly recreate the original garment, provided it results in a satisfactory outcome for the wearer.</p>
<i>The Trousers</i>	<p>A single technical mechanism within a garment that facilitates extended use may be applied to different garment types and styles.</p>

TABLE 4.6. SUMMARY OF FINDINGS OF THE SERIES OF GARMENT PROTOTYPES

A garment designed with affordances of sustain-ability outlined above, including provisions for repair and re-modelling, might contribute to new habits of garment care in use by making sustain-able clothing care practices available to wearers. While many are well practiced these affordances can be gathered as a combined strategy for design, and include:

- Design for durability: reinforce areas of wear, use durable fabrics and trim, robust construction
- Design for adaptability: allow for changes in size and style
- Design for easy intervention: use simple production equipment and methods so later changes are easy to perform
- Design for easy replacement of parts: use a combination of fabrics within garments such that replacement with contrasting fabrics is suitable
- Design opportunities for renewal through re-making
- Design for a range of aptitudes: consider the skill level of the wearer in making repairs and modifications, offer simple as well as advanced options

While the various explorations undertaken have investigated how design can make sustain-able clothing practices available to wearers within the garment artefact, they have also revealed that those practices, including the invitation to interact, also need to be designed. That is, even if a garment is designed and manufactured according to the list above, its enduring capacities may be entirely overlooked if they are not clearly signalled to the wearer. Further, that once the invitation to wear the garment with sustain-ability is accepted, the wearer may need assistance to do so. For example, guidance on making repairs and alterations.

The next phase of the research investigates different ways to enable wearers to take up the self-sustaining capacities identified through *The Living Wardrobe* prototypes through practice. The garment artefact is examined for its capacity to communicate its futuring potential to its wearer. Further, potential methods of accessing and amplifying its message are explored. A community of practice approach is proposed to support actions of repair and re-modelling to extend use. Digital media is explored for its capacity to deliver learning materials specific to the garment and connecting wearers to a community of practice.

## 5 WEARING THE LIVING WARDROBE

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*"Design timely things, things that can last longer by being able to change over time. Design things that are not finished, things that can keep on by keeping on being repaired and altered, things in motion."*<sup>425</sup>

– Cameron Tonkinwise

Chapter 4 demonstrated a connection between the design and use phase within the garment lifetime and proposed a range of ways in which garment design can afford practices of sustain-ability in clothing-fashion. Increasing wearer participation rightly makes the connection between the wearer's active participation and design as an on-going condition. Tonkinwise makes a sensible recommendation, but in terms of fashion, a core issue is the generation gap in knowledge surrounding domestic practices of making. In this case, garment literacy around construction, sewing and mending are no longer common practices. This chapter discusses further research practice that explores wearer engagement and shared practice between designers and wearers for their potential to signal futuring possibilities and build capability towards an active community of practice around extended use of clothing-fashion. In addition, the potential of the garment artefact to enable a continuing connection between the designer and wearer is examined and the implications for practicing fashion design with sustain-ability are discussed.

### 5.1 ENGAGING WEARERS IN PRACTICES OF EXTENDED GARMENT USE

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'Participatory design' describes various methods of incorporating input from the wearer within the design and/or manufacturing stages of the garment, as discussed in Chapter 2. These range from mass-customisation, where garments are personalised at the point of sale,<sup>426</sup> to bespoke made-to-measure tailoring<sup>427</sup> to unfinished garments for the wearer to complete to their own specifications.<sup>428</sup> If the personalised, unique outcome results in the garment being more fit for purpose than those mass-manufactured to standardised specifications, it will potentially be used more frequently and for longer.

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425. Cameron Tonkinwise, "Is Design Finished? Dematerialisation and Changing Things," *Design Philosophy Papers* 2, no. 3 (2004/09/01 2004), <https://doi.org/10.2752/144871304X13966215068191>, p.27

426. For example, [eshakti.com](http://eshakti.com)

427. Captains of Industry, "Captains of Industry."

428. make{able}, "make{able}."

### 5.1.1 PARTICIPATORY RE-DESIGN

The series of garment prototypes developed within this study suggest an alternative approach to participatory fashion design practices that foster wearer participation within the use phase of the garment lifetime. The prototypes explore how the wearer may contribute to the garment's evolution, through actions of repair and re-modelling to update the garment as needed. Participatory design strategies repositioned from the design phase to the use phase of the garment lifetime, become strategies of participatory *re*-design. Collaborative activities of development, including design, co-manufacture and customisation are transposed to the use phase to become practices of co-re-design, through product *re*-development, inclusive of repair and re-making (Figure 5.1). The inclusion of provisions within garment design for such participation has been the focus of the previous chapter. A range of methods for designing clothing-fashion with sustain-ability was proposed (see Chapter 4). Participatory re-design as an approach to fashion design for sustain-ability suggests a method to 'design back from the future to the present'<sup>429</sup> in which provisions for likely future actions of repair and re-making are included in garment design.

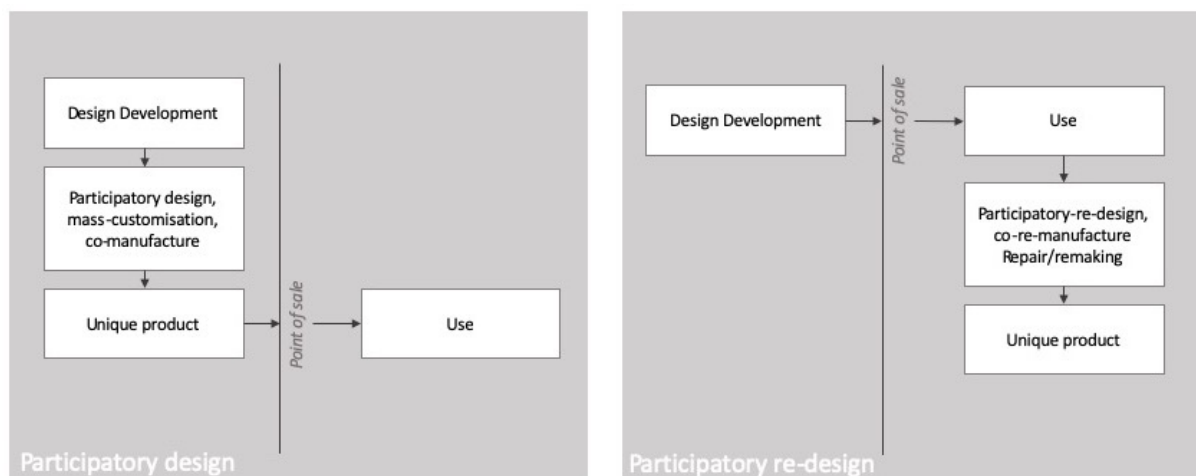


FIGURE 5.1. PARTICIPATORY DESIGN STRATEGIES OF PRODUCT CUSTOMISATION ARE TRANSPOSED FROM THE PRODUCT DEVELOPMENT PHASE TO THE USE PHASE AS STRATEGIES OF PARTICIPATORY RE-DESIGN.

429. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.147

Richardson might describe *The Living Wardrobe* garments as 'pre-hacked',<sup>430</sup> where "products are intentionally designed to be understood, re-envisioned and re-made."<sup>431</sup> Whereas 'hacking' describes the practices of users to break open 'black box' products to repair or modify them,<sup>432</sup> 'pre-hacking' describes the deliberate design of products for adaptation by users. The practice-led approaches of Open Design,<sup>433</sup> developed following the technological revolution in the early 1980s, inform the fashion practice element of this research. Applying these concepts to fashion practice aligns with practices of garment re-modelling guided by the affordances of the garment and allows for both pre-determined and improvised outcomes.<sup>434</sup> In support of wearers hacking the garment, *The Living Wardrobe* in the spirit of Open Design, further shares information on the garments' construction alongside the 'know-how' users need to undertake the 'pre-hacks' afforded. The same shared know-how might support improvised hacks as well.

Designing for participatory re-design as a strategy of fashion design for sustainability preserves the conventional fashion design process.<sup>435</sup> Unlike participatory design methods, it does not require the designer to modify their design practice to include the wearer's input prior to the point of sale. It maintains the designer's autonomy over the initial design but supports the wearer to later intervene in the design to modify it over time to meet their changing needs. Designers are able to have an enduring relationship with the products of their practice by participating in this extended design phase. As such, design for participatory re-design can be readily included in the conventional fashion design process which is extended to include consideration of future use, to design in suitable physical garment affordances for likely adaptation.

Hacking is a self-directed action often undertaken in spite of the product's design.<sup>436</sup> Whereas pre-hacking requires that the pre-empted hacks are signposted in some way. The Sans jacket replication investigation (see Chapter 3) and *The Cowl Dress* prototype (see Chapter 4) had called into question the capacity of the wearer to identify the opportunities for re-modelling the garments, and further flagged the importance the of the skill level of the home sewer to undertake any 'pre-hacks' afforded by the garment. However, these investigations had also suggested possible methods that might be employed within the garment design to make visible and enable uptake of, its futuring capacities.

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430. Otto Von Busch similarly references Open Source design and hacking but in a different context of design activism, that is not relevant to this section. Von Busch, "Fashion-able: Hactivism and engaged fashion design."

431. Mark Richardson, "Pre-hacked: Open Design and the democratisation of product development," *New Media & Society* 18, no. 4 (April 1, 2016), <https://doi.org/10.1177/1461444816629476>, p.658

432. Richardson, "Pre-hacked: Open Design and the democratisation of product development.", p.655

433. R. Vallance, S. Kiani, and Samir Nayfeh, *Open Design of Manufacturing Equipment* (2001).

434. Miles Park, "Defying Obsolescence," in *Longer Lasting Products: alternatives to the throwaway society*, ed. Tim Cooper (Farnham ; Burlington, VT: Gower Pub., 2010), p.99

435. It should be noted that customisation at the product development stage is not precluded and is attempted in *The Cowl Dress* through provision for the wearer to make the garment from a pattern. Therefore, participatory design and participatory re-design are potentially complementary strategies for extended use that might be employed in tandem.

436. See for example, Jules Yap, "IKEA Hackers," 2006, accessed January 23, 2019, <https://www.ikeahackers.net/>.



## 5.2 SIGNALLING THE FUTURING CAPACITIES OF THE GARMENT

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During the prototyping phase of the research study, it became apparent that the futuring capacities incorporated into the garment designs for *The Living Wardrobe* might be overlooked if the wearer cannot recognise them as such. For example, a wide seam allowance affords alteration but is also a quality that is not a visible design feature such as a patch pocket or wide collar. In the future, it is possible that a fashion brand that adopts the design for extended use strategies proposed by this research may come to be recognised for them, and that awareness will assist the garments' enduring capacities being accessed by subsequent wearers. However, while these enduring design approaches are new to mainstream manufacturing practices, attention needs to be drawn to them. Therefore, a more explicit method of signalling the enduring capacities of the garment was sought by investigating the potential of extending existing garment labelling.

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### 5.2.1 GARMENT LABELS

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Garments typically carry a number of labels. Some are permanently affixed within the garment, others temporarily applied to the outside. As required by national legislation, all garments for sale in Australia must be labelled with their country of manufacture and care instructions. In addition, internal garment labelling indicates the garment size and brand. This labelling is at times expanded to include marks of accreditation, for example, registered fibres (Woolmark), performance technology (Nike Dri FIT), ethically accredited manufacturing (Ethical Clothing Australia). These labels are permanently stitched into the garment and may be printed, woven or embroidered. Garment labels are necessarily small, permitting only a few lines of text or a logo and rely on the wearer's existing knowledge to interpret the references (for example, washing symbols). Additional product information is provided on swing tags. Swing tags are temporary cardboard or plastic tags, secured to the garment with a plastic attachment or cord and pin, to be removed and discarded after purchase, prior to first wear. At the initial point of sale, the enduring capacities of a garment can be detailed on swing tags and through additional product information in-store or on a website. However, once the garment has entered use and is later passed on to a new wearer or enters the second-hand market, this supporting information is lost. Alternatively, internal garment labels offer limited space to describe all the enduring attributes of the garment. Therefore, the question became: What type of label might signal the futuring capacities of the garment? And, How can a label provide a reference to where that information can be found? To this end, the potential of a label featuring a Quick Response (QR) code was explored. The choice of a QR code instead of alternative tag technology is discussed in the following section.

## 5.2.2 GARMENT LABELS WITH A QR CODE REFERENCE

QR codes are graphic codes containing embedded information to be read by an imaging device (e.g. a camera). Developed in the 1990s to track components through the manufacturing and distribution supply chain in the automotive industry,<sup>437</sup> QR codes have since been used for a wide variety of applications, including consumer facing marketing. The integration of QR code readers into smart-phone cameras has seen a proliferation in the usage of QR codes in recent years. QR codes are useful in the context of this project for a number of reasons. They are simply generated through free software without any great technical knowhow. When read by a smart-phone camera, the software displays the information contained and actions the embedded content. Because a QR code is a graphic pattern, it can be modified<sup>438</sup> in its visual design appropriate to the aesthetics of the brand style and product (Figure 5.2).

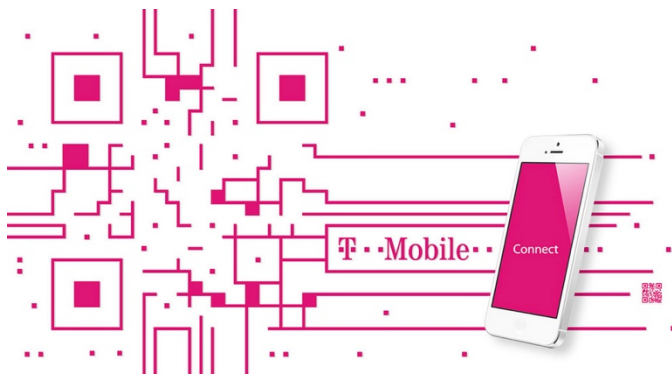


FIGURE 5.2. T-MOBILE ADVERTISEMENT WITH EMBEDDED QR CODE (ARTWORK BY T-MOBILE, QR CODE BY QRCANVAS)

### 5.2.2.1 QR CODES IN FASHION

QR codes are used widely in fashion advertising and in retail sales, yet their capacity to make accessible more detailed product information has so far been under-utilised. The bold geometric graphic form of the QR code has been inspiration for a number of designers who have incorporated QR codes into garment designs where they have sometimes been functional, other times not. In 2011, London Royal College of Art graduate, Thorunn Arnadottir created a crystal beaded QR code dress in a 'tribal style' for Icelandic pop star Kali from the group Steed Lord (Figure 5.3).<sup>439</sup> When scanned, the QR code links to a website about the band.<sup>440</sup> At New York Fashion Week in 2013, designer Vivienne Tam showed a

437. Denso ADC., "QR Code Essentials," 2011, accessed September 1, 2016, <http://www.nacs.org/LinkClick.aspx?fileticket=D1FpVAvvJuo%3D&tabid=1426&mid=4802>.

438. Within limits to maintain legibility

439. The dress makes deliberate references to tribal styles which Thorunn Arnadottir says is a comment on the tribalism of online social networks. Rose Etherington, "QR U? by Thorunn Arnadottir," *de zeen*, 30 June, 2011, accessed November 12, 2018, <https://www.dezeen.com/2011/06/30/qr-u-by-thorunn-arnadottir/>.

Image source Amanda Kooser, "QR U?: Pop star dress gets beady with QR codes," *CNet*, July 2, 2011, accessed January 26, 2019, <https://www.cnet.com/news/qr-u-pop-star-dress-gets-beady-with-qr-codes/>.

440. "QR U' dress is a fashion trend of new generation," accessed 12 November, 2018, [http://qr.biz/articles/qr\\_u\\_dress\\_\\_is\\_a\\_fashion\\_trend\\_of\\_new\\_generation/](http://qr.biz/articles/qr_u_dress__is_a_fashion_trend_of_new_generation/).

dress with QR code worked into a Pop-Art style graphic of Barak Obama (Figure 5.4). The QR code wraps around the bodice and under the arm, rendering it impossible to scan. The use of the QR code in Tam's work has been reviewed as "a comment perhaps on the relationship between the imbalance of human connection vs. technological accessibility."<sup>441</sup>

*Image removed for copyright purposes.*

FIGURE 5.3. DETAIL OF BEADED DRESS  
FEATURING SCANNABLE QR CODES BY  
THORUNN ARNADOTTIR, 2011

*Image removed for copyright purposes.*

FIGURE 5.4. VIVIENNE TAM; 2013, DRESS  
FEATURING DECORATIVE USE OF A QR CODE  
IMAGE

One company that has adopted QR codes as a tool to communicate with the consumer is REMO Recycle Movement. Based in the Netherlands, REMO produces recycled denim fabrics for use in garments and homewares. Attached to these products is a printed label with the percentage of

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441. "Vivienne Tam's Pop Art Persuasion," Mercedes-Benz Fashion Week Fall '13, Fountain of 30, February 10, 2013, accessed November 12, 2018, <https://www.fountainof30.com/mercedes-benz-fashion-week-fall-13-vivienne-tams-pop-art-persuasion/>.

Image source: Kelly Schwarze, "The QR Code Makes a Fashion Week Appearance," Popsugar, February 11, 2013, accessed October 15, 2018, <https://www.popsugar.com/tech/Vivienne-Tam-QR-Code-Dress-27892219>.

recycled denim and a QR code (called the REMOkey) that links the garment to the details of its circular production process.<sup>442</sup> These details include how much water and energy has been used and saved in the production of the garment. REMO advises the European Clothing Action Plan on recycling textiles and has partnered with a number of brands to bring recycled denim to the mainstream market.<sup>443</sup>

#### 5.2.2.2 ALTERNATIVES TO A QR CODE

A QR code label was selected for this study because it is familiar to consumers and easy to produce as a textile label. A passive<sup>444</sup> Radio Frequency Identification Device (RFID) tag was also considered but excluded for being less accessible to both producers and consumers. RFID tags are small plastic cased, electronic devices that need to be inserted into the garment, usually concealed within a larger fabric tag in the side seam (Figure 5.5). For example, in 2009, German brand Gerry Weber introduced a RFID tag stitched under the care label of every garment. Used to improve inventory management, the tags are deactivated at purchase.<sup>445</sup> Like a QR code, it is useful for inventory management, tracking products across a supply chain. The tag can be scanned by dedicated smart phone software to display the information contains. Because the tag is electronic rather than graphic, scanners can read RFID tags at some distance. While this would speed up the supermarket checkout queue, it has raised concerns regarding privacy if information retrieved from RFID tagged items is used to track people. Despite this, as QR codes have become ubiquitous in recent years, RFIDs may become so into the future, and could be used in much the same way as QR codes are discussed here.

*Image removed for copyright purposes.*

FIGURE 5.5. RFID GARMENT LABEL IN GERRY WEBER KNITWEAR

442. REMO Recycle Movement, "REMOkey," 2017, accessed May 20, 2017, <http://remokey.com/>.

443. Including Stay OK by Mud Jeans, recycled jeans from Asos. REMO Recycle Movement, "REMOkey."

444. Passive RFIDs differ from active ones in that they contain but do not transmit information and therefore have no battery. Leo E. O'Bannion and Mark E. McMurtrey, "RFID in the Retail Supply Chain," *Journal of Strategic Innovation and Sustainability* 13, no. 1 (2018), p.70

445. Rhea Wessel, "Gerry Weber Sews In RFID's Benefits," *RFID Journal* (December 2, 2009), <https://doi.org/https://www.rfidjournal.com/articles/view?7252#back-from-modalarticle%20ref:%20https://apparelmag.com/gerry-weber-roll-out-rfid-inventory-management-and-loss-prevention>.

### 5.3 CONNECTING TO THE FUTURE: A DESIGN BRIEF

In addition to connecting the garment with its past (providing transparency of the supply chain as does REMO), QR code labels present the opportunity to connect the garment to its future, by providing a durable link between the designer and subsequent wearers of the garment. A number of possibilities were considered in how this might be practically employed:

1. the same QR code is included in all *Living Wardrobe* garments that links to a website. Once the website is accessed by scanning the code in a garment, the website visitor navigates through the menus to the resources relevant to their garment. Locating relevant information could be challenging if the website is large.
2. each type of garment has a specific code that retrieves only resources relevant to that type of garment (for example, all trousers). Some information retrieved may not be entirely relevant to the specific garment scanned.
3. each style of garment has a specific code that retrieves only resources relevant to that style of garment (for example, the *pleated-leg* trouser). All information retrieved would be relevant to the specific garment scanned.
4. each individual garment produced has a unique code, that retrieves only resources relevant to that style of garment (the *pleated-leg* trouser) and provides scope for the documentation of the individual garment's narrative to evolve through user contributions (for example, every single pair of *pleated-leg* trousers made).

At the commencement of the label prototyping process, option 1 was excluded for not meeting the aims of the research as effectively as options 2,3 or 4 would. Option 4 held the most promise to support 'living' garments and so a process for the production of a series of labels with unique QR codes was pursued.

The brief formulated was to prototype a QR code label and a website of resources for *The Layered Top*, to explore how this might support practices of extended use and shared responsibility between designers and wearers within the garment lifetime. Similar to the brief for *The Culottes*, the aim of this experiment was to experience the extended design process required to produce the digital resources necessary to support the garments within *The Living Wardrobe*. This would test the feasibility of the inclusion of a QR code labelling system for product longevity within a conventional fashion design and production process.

#### 5.3.1 PROTOTYPE DEVELOPMENT: LABEL DESIGN

A unique code in each garment necessitates the continual generation of new QR code stitch patterns and a different label in each garment. This precluded outsourcing the production of the labels to a specialist label manufacturer because they only produce large minimum quantities of identical labels. It also dictated that the label was embroidered rather than woven since weaving individual labels is far more labour intensive than embroidery. While the labels might have been easily printed, embroidery

was preferred for its durability. Further, embroidery contributes to the label's function as a signifier of the level of the brand, where well-designed, neatly affixed woven or embroidered garment labels connote the quality associated with designer brands.

In determining the most appropriate method of embroidery, I encountered technical constraints, particularly in regard to size, such that a robust, scannable code is produced. Designer labels are often small, approximately 20-30 mm high by 40-50mm wide, however to ensure a legible QR code, the stitched design could not be made smaller than 40 mm square, which impacts where and how it can be affixed to the garment. The flexibility of a large QR code label can also cause problems when scanning the code if the code does not sit flat. In a garment, it is likely codes will be scanned vertically when the garment is hanging, not flat on a surface. I considered that potentially the code might be embroidered straight onto the garment (not onto a label), but this can impact the legibility of the code which relies on the high contrast of the code against its background.

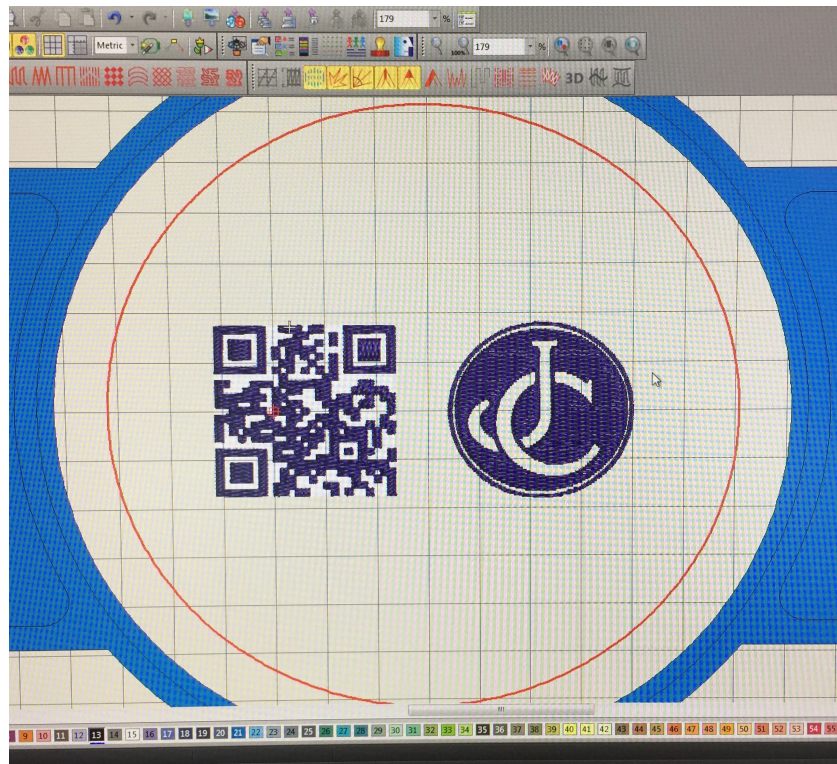


FIGURE 5.6. SCREENSHOT OF QR CODE EMBROIDERY DEVELOPMENT

A series of labels was prototyped at RMIT University, using Embroidery for Corel Draw software (Figure 5.6) and stitched on a Barudan embroidery machine. Working through the technical considerations above, the most suitable label was determined to be a 40mm square, densely stitched, high contrast sew-in label of black thread on cream calico. The code was affixed to the cardigan of *The Layered Top* for which supporting online resources were generated (Figure 5.7).





FIGURE 5.7. DETAIL OF THE CARDIGAN IN THE LAYERED TOP, FEATURING THE QR CODE LABEL.

### 5.3.2 EVALUATION OF THE PROTOTYPE QR CODE LABEL

With the edges of the calico backing folded under, the embroidered QR code label prototype stitched easily into the back neck of *The Layered Top Cardigan*, where it is highly visible. A designer label embroidered in the same thread on calico reflects the monochrome graphic aesthetic of the QR code to better integrate the code into the brand identity. With further experimentation in the methods of embroidery, the size of the label might be further reduced, and automation of unique codes and linked URLs could be developed through software programming. As the intermediary between designer and wearer, the QR code label enables new possibilities for collaboration over time in support of extended garment use. These possibilities are explored through the concurrent development of a website of garment resources, discussed below.



### 5.3.3 LABELLING TO ACKNOWLEDGE PARTICIPATION

Producing labels individual to each garment led to further considerations of other ways garment labelling might support extended garment use by sequential wearers. Inspired by the experience of sewing the Sans jacket pattern (see Chapter 3), a garment label might be a place where acknowledgement can be made of the contribution of future 're-modellers' of garments. Quite simply, the size of the designer label might be expanded to provide space for wearers to add their mark adjacent to the designer's, at the time they re-model the garment (Figure 5.8). Potentially this provides reward for effort, insulates the brand from any negative association through poor quality (re-)make and contributes to the evolving, unique narrative of the individual garment by indicating its provenance to subsequent owners. Further, by making apparent the garment's life already lived, it begins to shift notions of ownership to temporary custody.

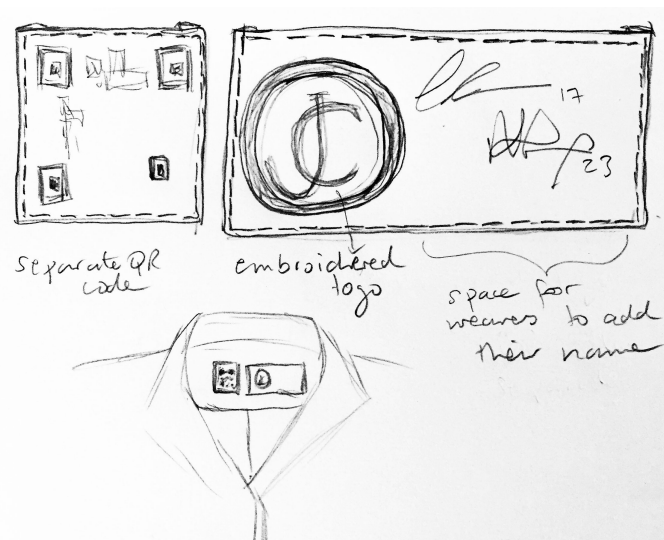


FIGURE 5.8. EXCERPT FROM SKETCH BOOK. THE DESIGNER LABEL CAN ALSO PROVIDE SPACE FOR FUTURE CONTRIBUTORS TO THE GARMENT TO MAKE THEIR MARK.

If adopted by fashion brands, the QR label within a garment as a link to resources for garment longevity becomes an important signifier within the wardrobe that some garments are designed for extended wear, highlighting that others hanging beside them are not. This type of labelling makes visible the value of the garment beyond the brand name and price tag, adding a new criterion to the fashionable wardrobe. It signifies an ethical purchase for those that value the distinction of ethical consumption,<sup>446</sup> while functionally it reminds wearers that the garment is designed for long-term wear and nudges behaviours towards repair, re-modelling and responsible discard to keep it in use. The QR label is an important device within *The Living Wardrobe* project for recruiting wearers into new practices<sup>447</sup> of

446. Isabelle Szmigin and Marylyn Carrigan, "Exploring the Dimensions of Ethical Consumption".

447. Gordon Walker, "Beyond individual responsibility: social practice, capabilities and the right to environmentally sustainable ways of living,"

participatory re-design and as a means of interjecting into existing practices of wearing clothing-fashion to steer them onto new paths<sup>448</sup> for sustain-ability.

QR codes in garments are rare at present, and likely to spark curiosity if prominently positioned within the garment (next to the designer label in the neck as above, rather than with the care label in the side seam). However, there remains the risk they will be ignored if there is no indication of what the code will reveal. When used in a retail or marketing settings (affixed to products or embedded in advertising) QR codes usually link to further product advertising or sales information. It can be argued there is a perception that the information retrieved through a QR code is non-essential information and so the effort to retrieve it is greater than the expected return, except where the value is hinted at ("scan for free offer!"). Possibly, a short tag line for the code, suitable to be stitched around it, needs to be developed (Figure 5.9.)



FIGURE 5.9. PROTOTYPE DESIGN FOR QR CODE LABEL WITH EXPLANATORY CAPTION

Were fashion brands to take up the QR code label as a means to connect wearers with the garment's enduring capacities, it is conceivable that the presence of an embroidered QR code label within a garment would become recognised a signifier of participatory re-design, elevating the brand in a market.

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in *Social practices, intervention and sustainability: beyond behaviour change*, ed. Yolande Strengers and Cecily Maller (Abingdon, Oxon: Routledge, 2015), p.52

448. Schatzki, "Practices, governance and sustainability.", p.23

## 5.4 CONNECTING THE PHYSICAL AND DIGITAL

The embroidered QR code garment label embeds within each garment of *The Living Wardrobe*, a durable hyperlink to a website that might be accessed at any stage in the garment's lifetime. The intention is to make available information on how to re-model the garments at the time it is needed. This information might include advice for repair, altering the fit of the garment, or changing its look and include instructions on how to do so. There is potential for this information to evolve as the garment ages, initially supporting sale and first wear, then re-modelling for subsequent wear. This presents new possibilities for counteracting the fashion cycle if garment styles produced years prior can remain contemporary through the ongoing discourse that surrounds them online. To complete the practice experiments, a website was prototyped to investigate what such a website might contain and what is involved in generating the content. The website is accessible at the URL <https://thelivingwardrobe.com>.

### 5.4.1 THE BRIEF FOR THE LIVING WARDROBE WEBSITE

A fashion label's website generally functions as a sales and marketing platform for a brand. It provides product information, background about the brand, news stories, a sales portal, links to social media platforms, stockists, and contact details. The purpose of the majority of fashion brands' websites is to promote the current season's collection and heighten anticipation for next season. There are generally few remnants of past seasons collections on the site and little sense of the brand's history provided. The previous collection might be available on sale still, but rarely are past collections archived online. Unlike most fashion websites that concern primarily current stock, *The Living Wardrobe* operates as a living archive of all styles ever produced.

In addition to the typical website functions listed above, the initial concept for *The Living Wardrobe* website aimed to inform wearers that may not be sufficiently conversant with garment construction methods, that the garment has futuring capacities (addressing the initial concern to reveal that a wide seam allowance allows a waist line to be taken out). It was proposed that the website would need to provide both an explanation that the garments can be readily modified and instructions on how to undertake those alterations. A site map was planned for a website as shown in Figure 5.10.

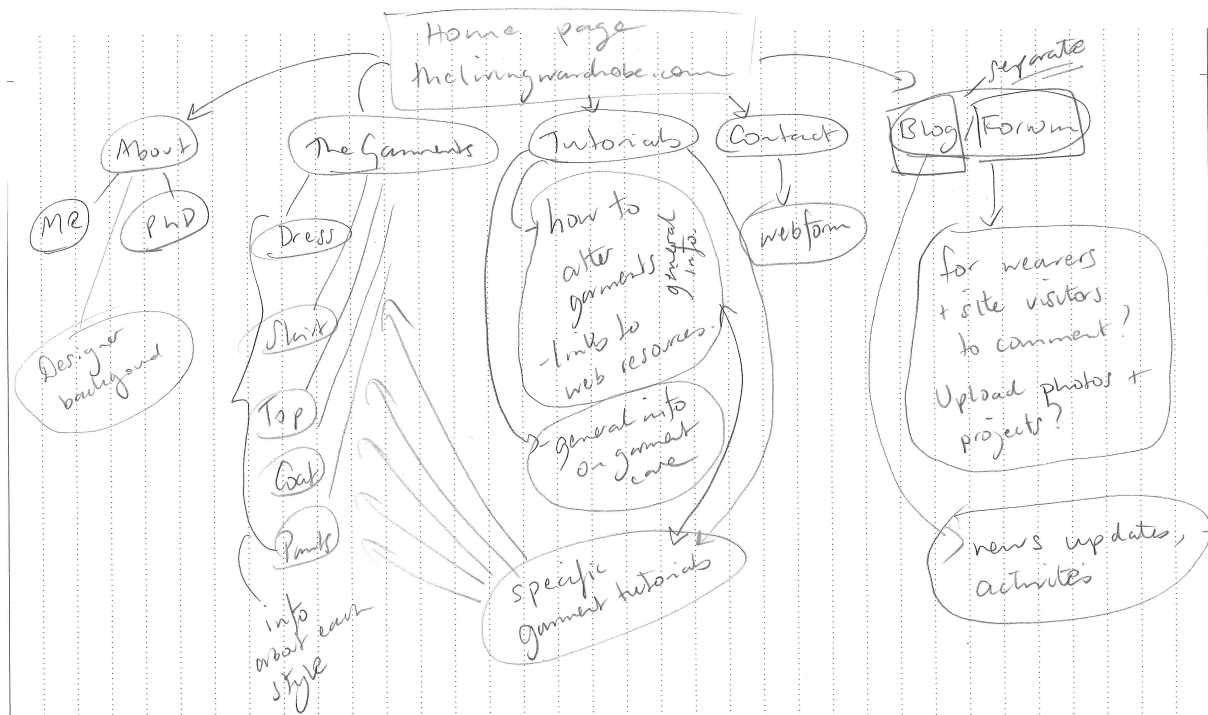


FIGURE 5.10. EXCERPT FROM NOTEBOOK: ROUGH SKETCH FOR WEBSITE STRUCTURE.

Because site visitors might arrive at the site by either scanning a code in garment or from an online search, the site design seeks to be easy to navigate from any landing point within. The site content is divided into four main menu items that are given simple titles descriptive of their content: The Project, The Wardrobe, Resources, and Contact. Within each of these website areas, drop down menus segment the information contained under each heading:

- The Project: Researcher background / explanation of the project
- The Wardrobe: includes a separate section for each garment style within *The Living Wardrobe*
- Resources: website resources to assist wearers to re-model *The Living Wardrobe* garments
- Contact: webform to contact the researcher

Also included in the site map are a blog to communicate current news and a forum to facilitate interaction amongst wearers of *The Living Wardrobe* garments and between wearers and the researcher. However, as the research project does not include production of the garments for retail sale, these parts of the website were not developed.

The simple initial structure of the website seeks to support the addition of new content as *The Living Wardrobe* evolves. Menu and sub-menu items can be added, and a search function offers a short-cut for site visitors to locate specific information. The website was first built using the open source Joomla! Content Management System (CMS) and later migrated to another open source CMS, WordPress. WordPress was initially designed for blogging, and because it is so easy to use, it has been widely

adopted by amateur website designers like myself. The website is hosted by Digital Pacific, an Australian Internet Service Provider that operates a carbon neutral business model.<sup>449</sup>

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## 5.4.2 WEBSITE DEVELOPMENT

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Creating the website was straight forward using Joomla! and WordPress. Online help manuals and user forums provided instruction where needed to supplement my trial and error approach to web design. Creating the digital resources for the tutorial to replace *The Layered Top* cardigan cuff also required trial and error to produce clear imagery, video and audio but was readily achieved with available domestic digital technology (smart phone and home personal computer). Following the typical method used for the production of amateur DIY videos for the web,<sup>450</sup> the video was captured on an iPhone, edited in iMovie software, uploaded to YouTube and embedded in the webpage. The videos were recorded in my home to emulate the likely setting in which they would be viewed. The intention behind this approach is to encourage participation by demonstrating not only what to do, but how it might be done, using the likely tools a home sewer would have (a domestic lock-stitch sewing machine) in a setting similar to their own.<sup>451</sup> This process of website development was not dissimilar to the process I was proposing for home sewers to re-model their garments: with a bit of help, have a go. The outcome I experienced was also as I hoped wearers might experience when re-modelling *The Living Wardrobe* garments: a feeling of satisfaction and achievement at learning, creating, and sharing something new.<sup>452</sup>

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449. Digital Pacific, "Green Hosting," accessed August 12, 2018, <https://www.digitalpacific.com.au/green-hosting/>.

450. See for example: "How To Make YouTube Videos And Share Them Online," May 29, 2013, accessed August 18, 2018, 2018, <https://blog.real.com/resources/how-to-make-youtube-videos/>,

Gretchen Siegchrist, "How to Make Your Own Videos for YouTube ", updated December 26, 2018, accessed August 18, 2018, <https://www.lifewire.com/making-youtube-videos-1082488>,

"How to Make Professional Quality YouTube Videos," accessed August 20, 2018, <https://www.wikihow.com/Make-Professional-Quality-YouTube-Videos>.

451. David Gauntlett, *Making is connecting : the social power of creativity, from craft and knitting to digital everything*, Second expanded edition. ed. (Cambridge, UK; Malden, MA: Polity Press, 2018)., pp.95-99.

452. Gauntlett, *Making is connecting : the social power of creativity, from craft and knitting to digital everything*.

### 5.4.3 WEBSITE PILOT PROJECT: LAYERED TOP TUTORIAL

The aim of *The Living Wardrobe* website is to make it easy for wearers to learn skills useful to re-modelling garments to keep them in use. This is achieved by linking each garment within the wardrobe to specific resources useful to its re-modelling to best ensure successful outcomes. Identifying and explaining appropriate techniques removes the need for the wearer to independently identify, master, adapt and apply generic sewing skills to their specific needs. To illustrate the barrier this might present to undertaking a repair for example, a YouTube search for “how to sew on a button” returns several different ways of attaching different types of buttons to different types of garments. Although the video tutorials are easy enough to follow, selection of the ‘right’ method for the specific garment owned, is likely to cause a novice to falter and potentially be put off attempting the repair.

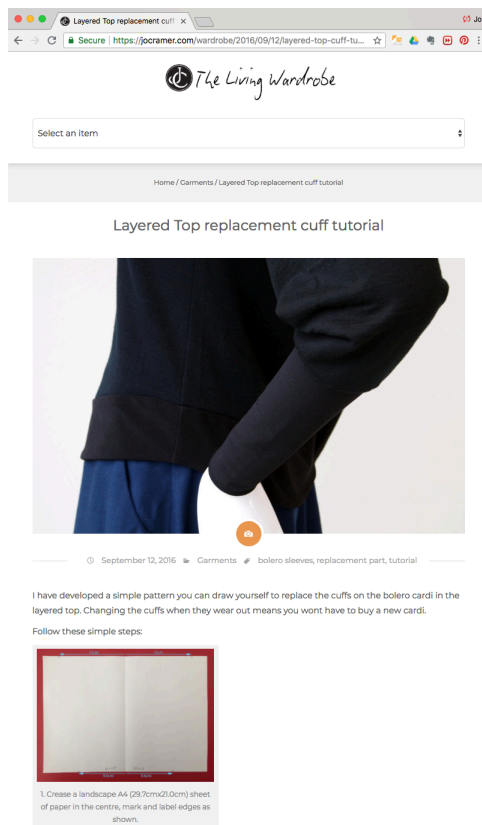



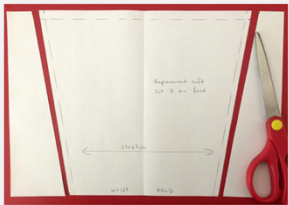
FIGURE 5.11. SCREENSHOT FROM THE LIVING WARDROBE WEBSITE.

To pilot the website, the resources required to replace the cuff on the cardigan of *The Layered Top* were generated (Figure 5.11).<sup>453</sup> The tutorial provides instructions on how to draft a replacement cuff pattern, remove the existing cuffs, cut out, make and sew on the replacement cuffs. This information is provided as a list of instructions for quick reference by competent sewers, and in video tutorials for those that need more guidance (Figure 5.12). Annotated photographs with step-by-step instructions

453. The tutorial can be accessed online: <https://jocramer.com/wardrobe/2016/09/12/layered-top-cuff-tutorial/>

explain how to draft the simple geometric shape of the cuff pattern from direct measurements. The video tutorial is segmented into the key stages of the construction process: cutting out the new cuffs, sewing them up, removing the old cuffs and attaching the new ones. By making each step an individual video, participants can more readily locate the specific guidance they may need to undertake the repair, re-watching or advancing through the steps as needed. The video tutorial for the cardigan cuff replacement is more extensive in the guidance it provides than the written instructions for *The Cow Dress* or *The Culottes* because additional information can be shared verbally while performing the actions of cutting and sewing. In this case, advice on how to correctly identify a knit fabric and select appropriate stitch types. If this information were to be included in written instructions, it would be lengthy and therefore potentially off-putting by making the task appear complicated.


THE PROJECT THE WARDROBE RESOURCES CONTACT



4. Add arrow parallel to wrist edge, mark "stretch". Label piece as shown. Cut along solid lines.

To cut out:

You will need fabric scissors, pins and tailor's chalk or a pencil.

1. Find stretch fabric that goes with the top, it doesn't have to match the sleeves, just choose something you like.
2. Pull the fabric crossways and lengthways see which way stretches the most, and fold it in half so the fold is in the direction of the most stretch. Hint: knit fabric usually stretches most perpendicular to the selvedge (finished) edge of the fabric.
3. Place the pattern piece with the edge marked "Fold" right on the fold in the fabric.
4. Pin in place and cut out.
5. Snip top corners at seam allowance notches, a few mm deep only.
6. Repeat steps 3-5 for the other cuff.

This video takes you through the above steps in detail and is suitable for beginners:  
(note, if the videos are fuzzy, click the cog bottom right, select Quality > 720pHD)

T 1: Cutting Out the Cuff




FIGURE 5.12.  
SCREENSHOT  
FROM THE  
LIVING  
WARDROBE  
WEBSITE.



#### 5.4.4 EVALUATING THE WEBSITE: THE LAYERED TOP CUFF REPLACEMENT EXPERIMENT

The cardigan from *The Layered Top* was given to a competent home sewer to test both the garment's in-built capacity for repair and the online resources created to support its repair. The participant was asked to scan the QR code garment label to access the website and follow the online tutorial to replace the cuffs.<sup>454</sup> *The Layered Top* prototype was intended to be a simplified means of achieving the objectives of *The Cowl Dress* and *The Culottes* in being easy to repair and re-model. The segmentation of the top into three components (cardigan, collar, and singlet), and the deliberate use of contrasting fabrics for the hem, cuffs and collar seek to make actions of repair and re-making easier throughout the lifetime of the garment.

During the trial, the participant kept a record of her experience in response to the same series of questions asked for the previous trials (Appendix 6). She reported that the task felt quick to do, taking her only 51 minutes to complete without error. She commented that the videos were easy to follow and gave her confidence in what she was doing. The participant concluded her reflective journal by saying, "Very satisfying to know this can be done easily and quickly. Next time I'm in the charity shop looking at clothes, I'll keep this technique in mind!" Her comment supports the notion that skills acquired in one context can inform attitudes and behaviours in other contexts. The participant had not been made aware that this is a goal of this study.

Two reasons were identified why *The Layered Top* trial was successful where *The Cowl Dress* and *The Culottes* were not: it is a much simpler task to undertake a repair than to make a garment, and the video resources supplied to assist with the garment repair were more supportive of participation than the written and illustrated instructions supplied with the garments for home manufacture. Video better communicates the tacit knowledge of making practices which text and still images cannot describe. Whereas written instructions list the steps to be undertaken, video demonstrates those steps, enabling participants to view *what* to do and *how* to do it. For example, in a video of a tailor cutting a suit, the viewer sees not only the steps a tailor follows to mark and cut the cloth, but the way in which his tools become extension of his body as he does so: how he holds the chalk, manipulates the cloth with his hands and drapes his tape measure around his neck.<sup>455</sup> In this way, video can fill in the (often frustrating) blanks between steps in a book.

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454. <https://jocramer.com/wardrobe/2016/09/12/layered-top-cuff-tutorial/>

455. Lashawn Anatole, "Tailor Cut A Suit," (Daily Motion, October 25, 2018). <https://dai.ly/x31qfcn>.

## 5.5 FACILITATING ENGAGEMENT WITH THE PHYSICAL THROUGH THE DIGITAL

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*The Living Wardrobe* website presents skills for repair and re-modelling specific to *The Living Wardrobe* garment styles. However, these skills are transferrable to many different kinds of garments. For example, the techniques explained to cut the cuffs off the cardigan from *The Layered Top* are methods that could be employed on any knit top with a joined band in need of replacement (cuff, hem, or collar). In this sense, *The Living Wardrobe* garment re-modelling tutorials serve as an introduction to the benefits and possibilities of competency in a few basic home sewing techniques. Structuring and supporting interactions with the garments further seeks to build the confidence of home sewers to attempt more challenging garment re-modelling activities of their own devising.<sup>456</sup> In short, to transition from 'pre-hacking' to hacking. To foster further experimentation, the 'Resources' section of *The Living Wardrobe* website acts a portal into the extensive dressmaking resources now available online. It is an evolving repository of links to web-based tutorials to supplement the specific tutorials associated with each *Living Wardrobe* garment. These tutorials have been selected to assist wearers develop further basic sewing skills that might be useful in undertaking independent actions of re-modelling. For example, links to YouTube videos on how to unpick overlocking, how to repair a hem, sew on buttons and press studs are included.<sup>457</sup> There are a number of anticipated benefits to including these additional resources on the website. Firstly, where tutorials for simple techniques already exist online (as videos or otherwise), linking to these resources rather than recreating them, saves time and costs and facilitates the quick development of the website supporting each of *The Living Wardrobe* garments. Secondly, by including tutorials authored by others within the online sewing community, wearers of *The Living Wardrobe* garments are connected to maker communities elsewhere online. The value of this is expected to be a sense of participation that encourages individual action.<sup>458</sup>

In *Making is Connecting*, Gauntlett discusses the positive disruptive force of digital technologies to transform society from a 'sit back and listen culture' to a 'making and doing' culture.<sup>459</sup> He talks at length about the impact of YouTube, the video server website, in sharing skills within the online maker community.<sup>460</sup> The success of YouTube he argues, lies not in the dissemination of highly produced videos, but in the millions of DIY videos shot by amateur makers. Rather than detract from the content being presented, the DIY production values of the videos reinforce the 'have a go' message. Video tutorials like those found on YouTube and the website created for this research project, can be described as instructables: "blogs, videos and websites that create a network of interconnected resources for social learning."<sup>461</sup> This research considers that through such networked resources,

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456. Salvia and Cooper, "The Role of Design as a Catalyst for Sustainable DIY.", p.28

457. See: <https://jocramer.com/wardrobe/resources/video-tutorials/>

458. David Gauntlett and Amy Twigger Holroyd, "On making, sustainability and the importance of small steps: A conversation", *Conjunctions: Transdisciplinary Journal of Cultural Participation* 1, no. 1 (2014)

459. Gauntlett, *Making is connecting : the social power of creativity, from craft and knitting to digital everything.*, pp.17-18

460. Gauntlett, *Making is connecting : the social power of creativity, from craft and knitting to digital everything.*

461. Torrey, Churchill, and McDonald (2009) referenced in Kate Orton-Johnson, "Knit, purl and upload: new technologies, digital mediations and the experience of leisure," *Leisure Studies* 33, no. 3 (2012), <https://doi.org/10.1080/02614367.2012.723730>, pp.312-313

Torrey, C., Churchill, E.F., McDonald, D.W. (2009). Learning how: The search for craft knowledge on the internet. CHI '09 Proceedings of the

"More efficient or sustainable past practices could be brought back from a dormant state to be performed anew and recirculated."<sup>462</sup>

Maller and Strengers argue that while traces of past practices may be documented in written form: recipes, manuals, instructions and in museum collections that exhibit the artefacts of practice, they are 'fossilised' in this documentation that cannot accurately record how the materials and competencies combine in the performance of the practice.<sup>463</sup> This is reflected in Orton-Johnson's research into the online knitting community Ravelry,

*For new knitters online resources are vital sites for learning and 'becoming' a knitter occurs through and with the digital. While many may recollect being taught to knit as a child they struggle to learn techniques through books or do not know anyone in their existing social network who can show them the basic skills.*<sup>464</sup>

*The Living Wardrobe* website has the potential to be an evolving repository of collective memories of practices of mending and making to which both the designer and wearers contribute. The resources provided for each garment within *The Living Wardrobe* might be modified over time to keep pace with fashion trends and in acknowledgement of the age of the garment. As the garment ages, perhaps the designer adds resources that include suggestions for down-cycling the worn garment to other purposes. Wearers might provide feedback and comment on the relevant success of re-modelling actions undertaken, in addition to uploading their own resources for others to use. This type of web interactivity might be encouraged through provision of blog like facilities that allow the upload of photos and comments from wearers of the garments who may have made changes by following, adapting (or even ignoring!) the resources provided. In this way, Fry's notion of "learning from the past" is extended beyond the reconceptualisation of past technology,<sup>465</sup> to the reconceptualisation of past practices for new contexts of sustain-ability.

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27th international conference on human factors in computing systems. Boston, MA: ACM Press

462. Maller and Strengers, "Resurrecting sustainable practices: using memories of the past to intervene in the future".

463. Shove, Pantzar, and Watson, *The Dynamics of Social Practice: Everyday Life and how it Changes*.

464. Orton-Johnson, "Knit, purl and upload: new technologies, digital mediations and the experience of leisure.", pp.312-313

465. Fry, *Design futuring: sustainability, ethics, and new practice.*, p.77

## 5.6 FOSTERING AN ONLINE COMMUNITY OF PRACTICE

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Establishing *The Living Wardrobe* website has been a means to think through how to facilitate a community of practice around the repair and re-modelling of garments. Communities of practice are defined as "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly."<sup>466</sup> A community of practice comprises a domain (a shared area of interest), a community (members that engage with each other to share information), and a practice (a shared repertoire of resources: experiences, stories, tools, ways of addressing recurring problems).<sup>467</sup> While communities of practice are typically found within organisations, governments and education where their structure may be formalised within the workplace, of interest to this research, is the way that communities of practice can also be informal communities that support social learning. For example, the community of knitters whose practice is facilitated by the website Ravelry, may not be aware they are part of a community of practice at all.

*The Living Wardrobe* website seeks to facilitate a community of practice by providing a stepping off point into garment re-modelling for sustainability through tutorials and links to further sites endorsed for their relevant content, and also proposes a space for the community to contribute their own content. This support is necessary to bring back into current use, practices of garment repair no longer learnt in school or at home. Beyond this, the potential for websites to support communities of practice in this way is to encourage the sharing of new problems and support collaborative innovation in developing solutions. At the conclusion of the research project, the website remains propositional rather than functional, suggesting what a website in support of a new community of practice around garment re-modelling might need to provide.

Fashion brands are yet to fully explore the potential of online peer communities. StyleShake was an innovative example, but during the course of this research study, the website has closed.<sup>468</sup> The StyleShake community was centred around its online mass-customisation tool with which members could 'design' their own fashion garments. Membership to the website provided a range of social benefits beyond purchasing a customised design. Custom garment designs could be saved in the customer's own 'collection' and shared with the community. The designs would be rated by the community, and thus StyleShake 'designers' might find their design on the "Top 10 sexy strapless" or another list of popular styles. Styles might be 'designed', saved and shared without a commitment to purchase, meaning participation in the website could be social.

Peer communities are more successfully forming at the micro-business level and within user communities that form around craft practices in clothing-fashion. Many websites that offer sewing patterns include a gallery for home makers to upload a photo of the finished garment,<sup>469</sup> while others

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466. Etienne and Beverly Wenger-Trayner, "Communities of practice: a brief introduction," (2015)

467. Wenger-Trayner, "Communities of practice: a brief introduction."

468. The website was located at <http://StyleShake.com>

469. See for example, Bootstrap Fashion Mylinego Inc., "Bootstrap Fashion."

encourage tagging on social media<sup>470</sup> and link directly to websites that sewers have made. For example, within the extensive blog of tutorials on how to sew the 'Bombshell Swimsuit' pattern,<sup>471</sup> Heather Lou of Closet Case Patterns<sup>472</sup> includes frequent references to the comments, feedback and website testimonials from sewers that have made up the swimsuit pattern. By revisiting her post to make these edits, Lou keeps the blog post current and the conversation open. Acknowledging the community in this way is an important part of encouraging participation and breaks down the traditional hierarchy of the designer dictating to the consumer by conversing with them instead.

The French blog *Japan Couture Addicts* was started by fans of Japanese patternmaking books in 2007. It comprises hundreds of posts by home sewers that have made up patterns from a deep and growing inventory of Japanese patternmaking books. The blog posts generally include photos of completed garments being worn by their maker and a narrative describing the process of construction undertaken, highlighting the successes and challenges, and providing advice for others planning to make the same pattern. These narratives often include photographs of the construction of the garment in progress. Some blog posts include links to tutorials that the contributors have created on their own websites to step others through the making process they have just undertaken.<sup>473</sup> In other posts, the contributor invites feedback on their fabric choices or design variations.<sup>474</sup> Comments on the blog posts are encouraging and congratulatory, and the frequency of questions posed within the comments suggests that site visitors are either planning to make the garment themselves or are inspired by the blog post to think through what's required for them to make it.<sup>475</sup> Wakkary says of the comment function on blogs: "Allowing and encouraging comments and feedback ensures that knowledge is actually exchanged amongst practitioners rather than just imparted."<sup>476</sup> Additionally, comments reward contributors for both undertaking and then sharing their projects. Peer recognition has been shown to be important to some ethical consumers and could be similarly significant to ethical consumers of clothing-fashion.<sup>477</sup> During the period of this research study, the online craft, sewing and dressmaking community has grown rapidly with many sustainability focused clothing projects described on blogs and shared widely through social media.<sup>478</sup> These often involve projects by non-experts 'having a go' at something, with the implied message 'If I can do it, you can do it too'.<sup>479</sup>

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470. See for example: <https://www.instagram.com/explore/tags/bombshellswimsuit/?hl=en>

471. Heather Lou, "Bombshell Swimsuit Pattern," Closet Case Patterns, accessed November 4, 2018, <https://store.closetcasepatterns.com/products/bombshell-swimsuit-pattern>.

472. Heather Lou, "Bombshell Sewalong," Closet Case Patterns, accessed November 4, 2018, <https://closetcasepatterns.com/tag/bombshell-sewalong/>.

473. See for example, vingt4, "Pattern Magic," Japan Couture Addicts Blog, April 12, 2016, accessed September 6, 2018, <http://japancouture.canalblog.com/archives/2016/04/12/33656877.html>.

474. See for example, joline-103 idées, "1er haut fini," Japan Couture Addicts Blog, August 19, 2007, accessed September 6, 2018, <http://japancouture.canalblog.com/archives/2007/08/19/5937017.html>

475. See for example, wildmary, "Tuto de la tunique du Pattern Magic 1," Japan Couture Addicts Blog, June 6, 2008, accessed September 6, 2008, <http://japancouture.canalblog.com/archives/2008/06/06/9475290.html>.

476. Wakkary et al., "A sustainable design fiction: Green practices," p.25

477. Helen Arce Salazar, Leon Oerlemans, and Saskia van Stroe-Biezen, "Social influence on sustainable consumption: evidence from a behavioural experiment," *International Journal of Consumer Studies* 37, no. 2 (2013), <https://doi.org/doi:10.1111/j.1470-6431.2012.01110.x>

478 See for example, Erica Penton, "My Handmade Wardrobe," accessed 19 August, 2016, <http://myhandmadewardrobe.com/>.

479. See for example, Sheena Matheiken, "Uniform Project," 2009, accessed September 6, 2018, <https://theuniformproject.com/>.

## 5.6.1 THE BENEFITS OF JOINING A COMMUNITY OF PRACTICE

*"When lots of people take the step into being active makers and sharers, it alters the character of that group previously thought of as the 'masses' – or the 'audience' – and moves us from a world of 'reception' to one of creativity, exchange, inspiration and conversation."*

- Gauntlett<sup>480</sup>

By introducing and sustaining practices of garment re-modelling for extended use, *The Living Wardrobe* garments and website are an invitation into the world of making, connecting the wearer to the digital maker network through the physical garment artefact. In their conversation, Gauntlett and Twigger Holroyd discuss the potential of amateur making to support sustainability, as visualised in the diagram below (Figure 5.13).<sup>481</sup> Amateur making offers an alternative way of engaging with world through making rather than buying. This engagement through making provides not only an outcome (the made object), but an enjoyable experience in the process of making. To take a further example from Orton-Johnson's discussion of Ravelry:

*...the process and the path that this leisure takes also shifts the focus from the completed object, and the pleasure that is derived from it, to the intangible and invisible pleasures embodied in that object and in the practice of knitting as a tactile and deeply embodied experience.*<sup>482</sup>

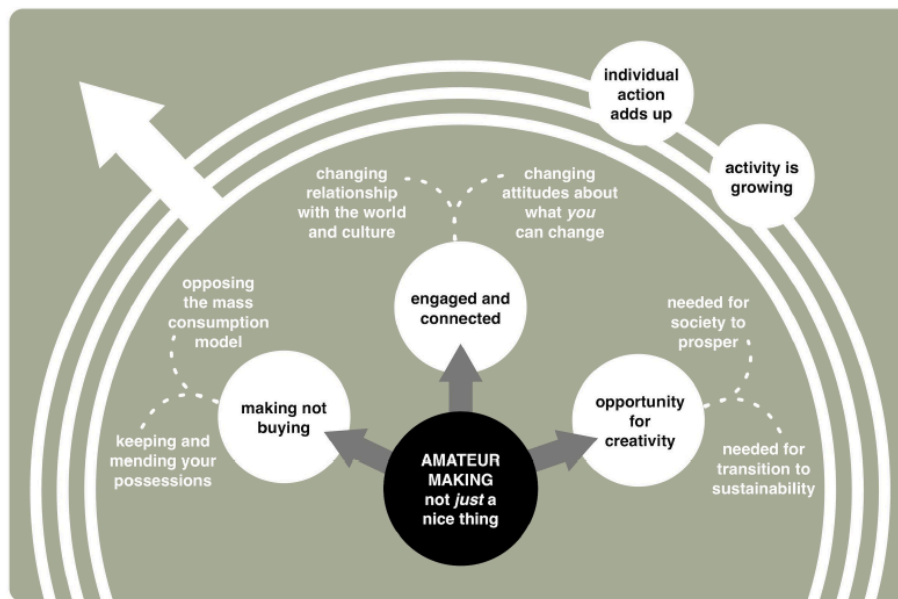


FIGURE 5.13. GAUNTLETT AND TWIGGER HOLROYD'S DIAGRAM OF THE RELATIONSHIP BETWEEN AMATEUR MAKING AND SUSTAINABILITY

480. Gauntlett and Twigger Holroyd, "On making, sustainability and the importance of small steps: A conversation'." p.11

481. Gauntlett and Twigger Holroyd, "On making, sustainability and the importance of small steps: A conversation'."

482. Orton-Johnson, "Knit, purl and upload: new technologies, digital mediations and the experience of leisure.", pp.317-318

The pleasurable experience of undertaking a creative activity was first described as “flow”, or the theory of optimal experience by Mihaly and Isabella Selega Csikszentmihalyi in 1988. Flow describes the state in which skill is balanced by challenge, resulting in an absorbing, enjoyable activity.<sup>483</sup> I had noted fashion students experiencing flow when learning to sew, and that teaching experience had suggested to me the potential for simple successful alterations (moving a button) to build confidence and enthusiasm to attempt more difficult changes (altering a seam, replacing a garment component) which could lead to more adventurous projects like making a garment from instructions. Further to the accomplishment of these skills, such “small steps into creativity”<sup>484</sup> bring with them sense of achievement and enjoyment also.<sup>485</sup>

In seeking to reintroduce domestic practices of garment maintenance, the support of digital technologies to grow digital communities around garment repair practices suggests great potential by amplifying the sense of accomplishment and enjoyment that such activities can bring which in turn may increase wearers’ confidence to extend their activities of garment re-making into further projects within and beyond *The Living Wardrobe*. Sewing has a very low barrier to entry, it can be performed with only a needle, thread and fabric. A few skills simply learnt can lead to a great variety of outcomes. DIY projects include every conceivable textile object, including a kitty cube,<sup>486</sup> a skirt made from recycled jeans,<sup>487</sup> a flower pot cover,<sup>488</sup> and a knife sheath.<sup>489</sup>

The social web 2.0<sup>490</sup> success of maker communities like the online knitting community Ravelry and Facebook groups like Australian Sewing Advice and Inspiration (the latter which has over 34,000 members as of February 2019),<sup>491</sup> suggest that there is potential for a commercial version as well. Early

483. Csikszentmihalyi and Csikszentmihalyi, *Optimal experience : psychological studies of flow in consciousness*.

484. David Gauntlett, “The internet is ancient, small steps are important, and four other theses about making things in a digital world,” in *Creative Technologies: Create and Engage Using Art and Play*, ed. Nelson Zagalo and Pedro Branco (London: Springer-Verlag., 2014), p.10

485. It is usual in a sewing class for both me and my students to be so engrossed in our project that we lose track of time and work into our lunch break.

486. “DIY Kitty Cube,” July 2, 2013, accessed September 10, 2018, <http://craftynightowls.blogspot.com/2013/07/diy-kitty-cubie.html>.

487. Laura Gummerman, “Make Your Own Jean Skirt!,” A Beautiful Mess, October, 2017, accessed September 10, 2018, <https://abeautifulmess.com/2017/10/make-your-own-jean-skirt.html>.

488. Professor Pincushion, “How to Sew a Burlap Planter,” (YouTube, September 10, 2018 July 21, 2015). [https://www.youtube.com/watch?v=czUSW96PL\\_o](https://www.youtube.com/watch?v=czUSW96PL_o).

489. “Leather Knife Sheath Tutorial,” December 31, 2014, accessed September 10, 2018, <https://www.mrlentz.com/2014/12/leather-knife-sheath-tutorial/>.

490. Whereas the World Wide Web (Web) was initially built as a platform to serve information, a succession of improvements introduced capabilities to incorporate user generated content, giving rise to social media. Credited with coining the term Web 2.0 in 2004, O’Reilly outlines the core competencies of Web 2.0 companies as:

- Services, not packaged software, with cost-effective scalability
- Control over unique, hard-to-recreate data sources that get richer as more people use them
- Trusting users as co-developers
- Harnessing collective intelligence
- Leveraging the long tail through customer self-service
- Software above the level of a single device
- Lightweight user interfaces, development models, AND business models

Tim O’Reilly, “What Is Web 2.0: Design Patterns and Business Models for the Next Generation of Software,” updated 09/30/2005, 2005, accessed 21 August, 2018, <https://www.oreilly.com/pub/a/web2/archive/what-is-web-20.html>.

491 “Australian Sewing Advice and Inspiration (Facebook Group),” accessed January 25, 2018, <https://www.facebook.com/aussewing/>.



attempts may falter, but in time, propositions like *The Living Wardrobe* can potentially reshape home sewing from creating entirely new garments from purchased fabrics to making as re-creation, commencing with materials already existing (the garment in need of transformation). As a final note of the impact of the interactive capacity of Web 2.0 technologies on the sharing of craft practices, it is interesting to note a point Orton-Johnson makes about the evolving knitting practice of members of the Ravelry website. Learning knitting through the shared projects of website community members leads knitters to incorporate those same digital practices into their knitting practice. Orton-Johnson quotes a Ravelry member to explain this point:

*It's odd really, I'm creating an actual thing but I'm also writing about it in my blog, uploading pictures of it from my phone to flickr, then updating my [Ravelry] projects with labeling and note taking and commenting, then getting the pics from flickr into Ravelry, then looking at how other people have done it, getting into it [Ravelry] has kind of added a whole other element to what knitting is for me that's quite removed from what knitting actually is in my hands. (Phillipa)<sup>492</sup>*

Social and collaborative digital practices are being folded back into physical craft practices contributing to the evolution of what members understand to be the practice of knitting. Possibly the practice of wearing clothing might be similarly inflected within an online community of practice that champions repair and re-making as part of the practice of wearing clothing-fashion with sustain-ability.

In facilitating a community of practice, *The Living Wardrobe* website seeks to extend what it means to wear a garment to incorporate those practices of re-modelling that enable its extended use. There is potential through these types of visceral networks to redirect the consumption of fashionable clothing and to contribute new definitions to fashion that arise from individual actions of re-modelling to keep garments current. Further, it helps to counter the argument that one individual's actions are not enough to 'save the planet' if individuals can see their efforts are matched by others. As a prototype of the facilitation of a community of practice around wearing fashion with sustain-ability, *The Living Wardrobe* website remains a proposition. The garments prototypes within this study have not been produced in quantity or sold to consumers. Therefore, it has not been possible to establish and test the type of online community of practice described above. The development of such a digital community around what might become *The Living Wardrobe* brand, is identified here as a future site of research.

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492. Orton-Johnson, "Knit, purl and upload: new technologies, digital mediations and the experience of leisure.", p.316

## 5.7 CHAPTER CONCLUSION

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This chapter has extended the concept of *The Living Wardrobe* to describe a community of sustainable fashion practice that combines physical garment artefacts with digital resources for social learning and sharing. Practice as a method has been used to investigate a practical means of designing clothing-fashion 'back from the future', in keeping with theories of redirective practice.<sup>493</sup> In recognition of fashion as a social practice comprising everyday habits and routines of dressing fashionably, the practice methods pursued have sought ways to intervene within existing consumer practices to suggest viable sustain-able alternatives that promote the extended use of clothing-fashion. The potential for self-sustaining garments, identified by their prominent QR code label, provide the wearer with the opportunity to rethink current practices of wearing clothing-fashion, and the means to redirect those practices for sustain-ability.<sup>494</sup> Similarly, the method of 'participatory re-design' to produce 'pre-hacked garments' is proposed as a means for designers to take responsibility for the life a garment will lead by designing for likely future use and re-use.

The existing use of garment labelling to communicate information about the garment to the wearer has been extended through the introduction of a QR code garment label to permanently link the garment to the online community of practice that supports its extended garment use. The online community suggests an extension on the function of the fashion band website to a hub of shared know-how facilitated by the brand. Tutorials on making garment repairs and alterations are supplemented with lessons on basic sewing skills that enable the wearer to undertake actions beyond the immediate Living Wardrobe garment. Facilitating the formation of a community around practices of extended garment use is suggested by providing opportunity for users to contribute their own resources and documentation of practices undertaken. Potentially, each garment manufactured might carry a unique QR code label that links to its own webpage: a unique evolving narrative, beyond the documentation of its provenance.

These mechanisms extend existing practices of fashion design for sustainability through thinking about design as a process that does not end at the retail point of sale. The result is the potential for a collaborative practice that engages the designer and user in an ongoing open design process that shares responsibility for the impacts of the garment during its lifetime. This suggests that design for sustainability models that centre the garment artefact are correct but underestimate the power of the garment's agency to encourage action. Chapter 6 concludes the thesis with a discussion of the potential contributions to be made by rethinking sustain-ability as relationship of responsibility based on the findings presented in Chapters 4 and 5.

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493. Fry, *Design futuring: sustainability, ethics, and new practice*.

494. Barnett, *Globalizing responsibility: the political rationalities of ethical consumption.*, p.76

## 6 CONCLUSION: MUTUAL RESPONSIBILITY

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In conclusion, this chapter will discuss the potential of the new insights and contributions to existing knowledge that have resulted from this research project. As well as situating existing handbook and toolkit approaches to sustainable design in clothing-fashion within a values framework, the value of utilising fashion practice as a method within creative practice research to generate new knowledge and understandings not merely new artefacts, is discussed in relation to core methodology for the discipline. Redirecting fashion practice to extend the conventional design process – rather than developing continuously new models – can allow designers to actively engage with strategies for fashion design for sustain-ability, as opposed to being dictated to by theoretical models of practice. The practice undertaken as a part of this study has demonstrated how this might be actioned by designing and using garments for extended use. In addition, the research has demonstrated that practicing sustain-able fashion is a collaboration between designers and wearers, and further suggests a way of sharing responsibility for garment sustain-ability across the garment lifetime. The major contribution of the thesis is to propose a model of mutual responsibility as a concept that is further promoted as a framework for practicing fashion design for sustain-ability.

Allowing the research to guide my conclusions rather than searching only for a pre-constituted result, the original question of the thesis evolved as the research project progressed. At the outset, the main focus was on determining whether garments could enable their own longevity. Yet as the doctoral study progressed, the key question became: What are the opportunities for garment design to enable enduring relationships of mutual responsibility in fashion? The review of literature and practice focused the study on enabling sustainability across the garment lifetime (Chapter 2). The Survey of Consumer Practices in Australia undertaken, had indicated that garment design and methods of construction can limit the garment lifetime by preventing changes necessary to meet evolving user needs. Concurrent research into historical garment production methods suggested past practices of fashion design that might be reintroduced to overcome these limitations (Chapter 3). Garment prototypes were developed to investigate how these past practices might be reconceptualised for contemporary womenswear (Chapter 4). At the same time, to ensure that the enduring capacities of the garments can be recognised and actioned, methods of scripting their use was also explored and supporting resources developed (Chapter 5). In sum, the research has shown that as the nexus of a reciprocal relationship between the designer and wearer, the garment artefact has great potential to enable practices of sustain-ability across its lifetime.

This thesis does not negate the importance of designing clothing-fashion with sustainability implemented within every phase of its production; rather, it seeks to emphasise that the garment can be *both* sustain-ably produced and foster sustain-able clothing-fashion practices of extended use. The garment artefact can facilitate the designer and wearer sharing responsibility for the sustain-ability of the garment lifetime. As such, in conclusion the following section discusses mutual responsibility in fashion design practice as a framework of enacting sustain-ability.

## 6.1 A NEW GARMENT LIFETIME MODEL

In Chapter 2, Life Cycle Assessment as a framework for action on sustainability was discussed. An interrogation of a typical garment life cycle model identified such models as problematic for designers seeking to use Life Cycle Assessment to direct strategies for design for sustainability, for a number of reasons. Firstly, while the Life Cycle Assessment diagrams like Payne's (2011) shown at Figure 2.8 segment the production of a garment into phases, the longest period within the life cycle, that of use, is not similarly segmented. Secondly, the equal division of all phases within the life cycle disguises the fact that the garment's longest phase of its life cycle is the use phase. Therefore, the imperative to design for sustainable garment use practices is diminished, particularly within a discipline where diagrammatic representations are an essential form of communication. Thirdly, garment life cycle diagrams represent a single garment lifetime, yet popular approaches to sustainability through extended use, describe giving garments multiple lives (Figure 2.16).<sup>495</sup> This research has identified that fashion design for multiple lifetimes mis-represents the actual garment life cycle and reinforces the anthropocentricity of sustainability methodologies that perceive the garment lifetime to be synonymous with ownership. As Payne's life cycle diagram plainly shows, the garment has only one lifetime, though it may change hands, be re-modelled, or re-purposed. Emerging research into clothing use and life expectancy was presented as a method of enriching the understanding of these sub-phases of garment use.

Payne's Life-cycle assessment diagram is revisited here as a device to help visualise the significance of the use phase within the garment life cycle. The diagram is taken as the starting point for the development of a holistic Garment Lifetime Diagram (Figure 6.1), which integrates Klepp's lifetime of clothes diagram (Figure 2.9). This model extends the work of Payne and Klepp by adjusting the phases of the life cycle diagram to provide an approximation of their duration, proportional to the overall lifetime of the garment. In Payne's original diagram, the phase of textile production is proportionally the same as design and distribution, when in practice, it is considerably longer. The amended diagram does two things. Firstly, it more clearly represents that the garment lives with the consumer/s for most of its life. Secondly, by segmenting the use phase, it fills in missing detail critical to the implementation of strategies for sustainability within the garment life cycle in support of long-term use.

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495. Fletcher, *Sustainable fashion and textiles: design journeys.*, p.109

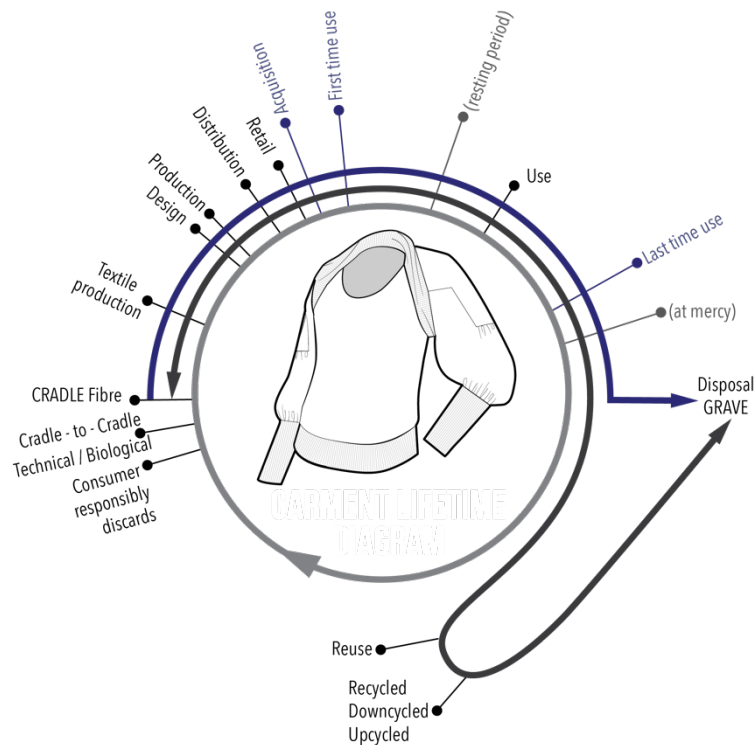


FIGURE 6.1. THE GARMENT LIFETIME DIAGRAM INCLUDES STAGES OF USE WITHIN THE LIFE CYCLE

### 6.1.1 EMBEDDING USE INTO THE GARMENT LIFE CYCLE DIAGRAM

In the Garment Lifetime Diagram resulting from this study, the use phase of the garment life cycle is presented as four sub-phases: first time use, resting period, last time use, at mercy. The subsequent phase of re-use and recycling is elongated to more accurately represent the potential of the extended lifetime of the garment achieved by these measures. Significantly, re-use and recycling might involve the garment changing hands, where currently the garment life is connected to a single owner. The transition of the garment from one wearer to another is an important design consideration within design for extended use. It is when the garment is 'at mercy' and at the point of divestment that the opportunity for re-modelling occurs and those strategies that facilitate re-use by the first wearer, might also facilitate re-use by subsequent wearers. A wearer may re-make a garment that is 'at mercy' to extend its actual use or may discard it by donating or gifting it and a subsequent wearer may then perform alterations to meet their own needs (Figure 6.2).

A review of the literature on clothing lifetimes and divestment practices revealed a lack of clarity in terminology for end-of-use scenarios that describes discarded garments as waste. The use of large bin-like receptacles by recycling agencies and charities for the collection of unwanted clothing reinforces this (Figure 1.3). Chapter 2 concluded that within the final phases of use, clearer terminology is needed; I thus provided new definitions to differentiate between the decision to discard a garment and to dispose of it into the waste stream.

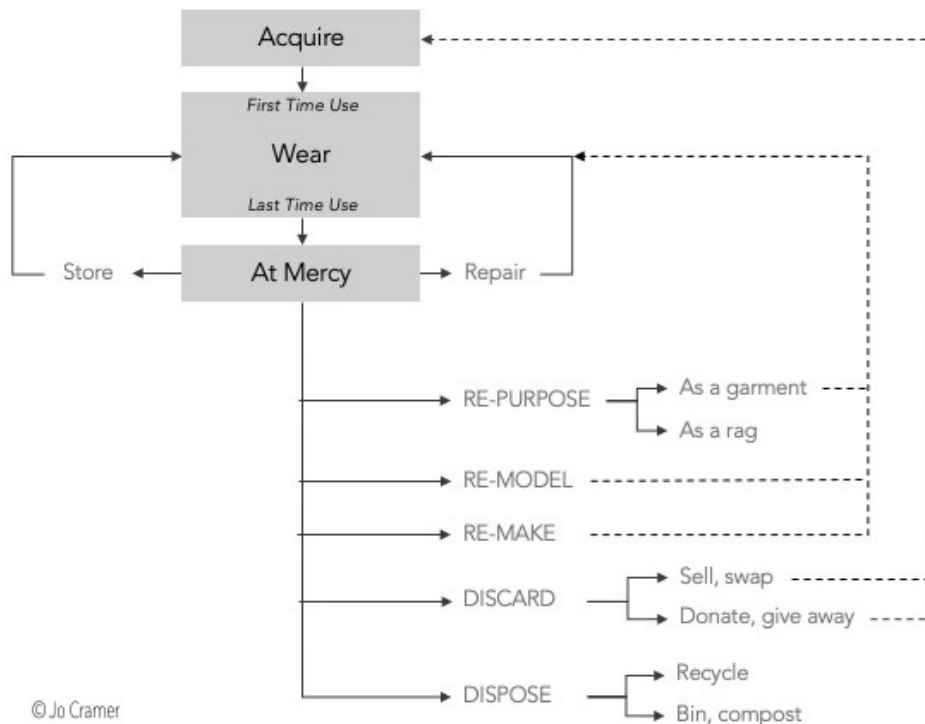


FIGURE 6.2. DIAGRAM OF THE STAGES OF GARMENT USE AND DIVESTMENT OPTIONS IN SUPPORT OF RE-USE.

Similarly, a consistent vocabulary of garment design strategies for extended use would be of benefit to designers. In Figure 6.2, four options are shown for a garment that is divested from the wardrobe: re-purpose, re-model, re-make and discard. As defined above (Chapter 2) the term *re-modelling* is proposed here to describe those actions that modify the garment to keep it 'in use' for either the current wearer or a new wearer. For example, changing the waist circumference to maintain functionality or shortening/narrowing the hemline in keeping with more contemporary tastes in fashion. In contrast, where garments are entirely taken apart and recreated in a new form, the term *re-make* is more appropriate. In this case, worn or outdated parts of the garment textile can be removed, and new textile parts introduced, possibly salvaged from other discarded garments. Re-modelling as a sustainable fashion practice, has been embraced by the DIY home sewing community, and to some extent by designers as an after-sales service. However, clothing-fashion design for future re-modelling has not yet been explored in any depth by fashion brands. The suite of prototype garments produced within this research study demonstrates how re-modelling as a practice of fashion design can enable both designers and wearers to act on their shared responsibility for the sustain-ability of the garment lifetime.

## 6.1.2 EMBEDDING RESPONSIBILITY WITHIN THE GARMENT LIFE CYCLE

At a surface level, the adjusted proportions within The Garment Lifetime Diagram (Figure 6.1) would indicate that since the garment is with the consumer for the longest phase of its life, the consumer therefore bears the most responsibility for sustain-ability. Alternatively, the comparatively long use phase offers substantial scope to reduce overall harmful environmental impacts by improving practices of wear and care, to which both producers and consumers can contribute.<sup>496</sup> The producer (particularly at the design stage), is well-placed to influence how the garment will be used.<sup>497</sup> For example, had the designer of *The Bird Dress* (as discussed in Chapters 1 and 3), selected silk instead of polyester georgette, it is likely the dress would be at rest for long periods in the laundry basket, awaiting a trip to the dry cleaner.<sup>498</sup> With reference to The Garment Lifetime Diagram, when the linear (blue) garment life cycle is extended or closed through re-use and recycling (dark grey and grey), reconsideration of the stages of 'use' as stages of 'use and subsequent re-use', expand the opportunities for design to contribute solutions where garments are designed with life-extension in mind.

Through the creative practice investigations described above (Chapters 4 and 5), the agency of the garment to facilitate a relationship of sustain-ability between the designer and wearer/s has been extensively explored as one of shared responsibility. The garment is the nexus of this relationship, maintaining the connection between the designer and wearer/s over its lifetime. By providing the option to connect the garment to a website with a QR code label, there is the potential for the designer and the wearer to form a relationship wherein they *share* responsibility for the garment's existence. Through this shared relationship the designer enables all future wearers to effect changes that may be necessary to keep the garment in use. This is different to other design for longevity approaches where the designer assumes responsibility for repair or disposal by offering services that support otherwise typical habits of consumption, namely to support the original owner of the garment.

In Figure 6.3, the Garment Lifetime Diagram has been further adapted by division into three segments that indicate with whom responsibility for that phase of the life cycle predominantly rests: with either the producer, the consumer or the reproducer. The diagram emphasises that responsibility for sustain-ability within the garment lifetime as opposed to the garment life cycle, is collective. The producer phase describes the textile manufacture, garment production, distribution and sale. The consumer phase describes use and re-use. The reproducer phase refers to the technical recovery of fibres for remanufacture, in support of the cycle commencing again.

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496. WRAP, "Love Your Clothes."

497. Payne, "The life-cycle of the fashion garment and the role of Australian mass market designers.", p.6

498. Additionally, the dress would create pollution with each dry clean.



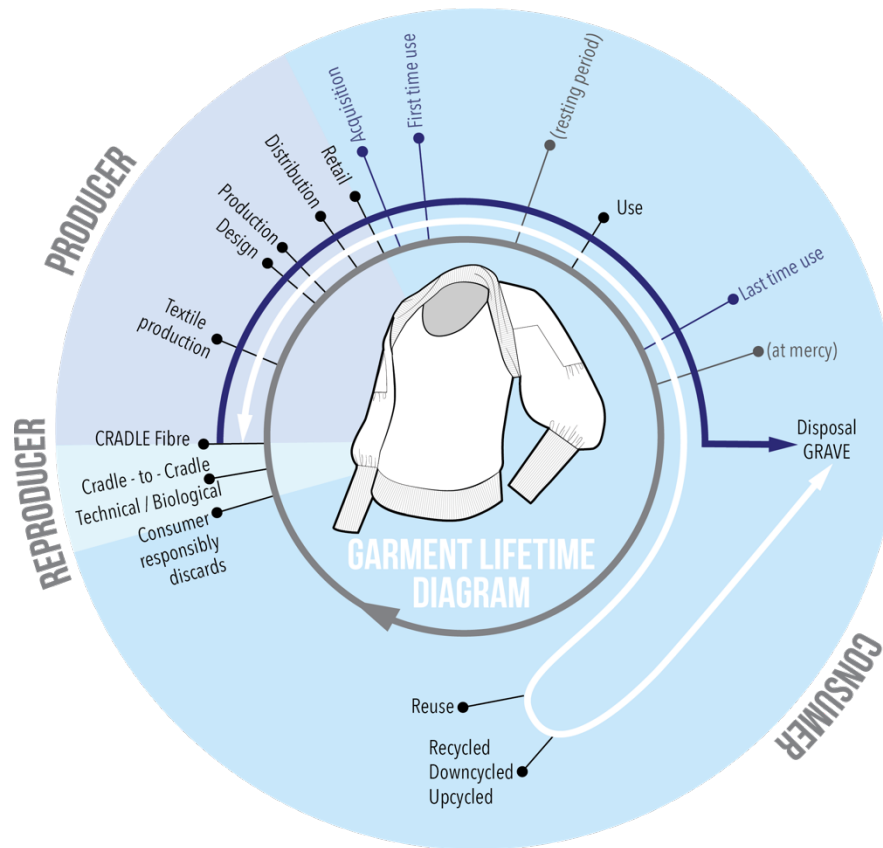


FIGURE 6.3. THE GARMENT LIFETIME DIAGRAM INCLUSIVE OF PHASES OF RESPONSIBILITY TO ENSURE THE GARMENT'S SUSTAIN-ABILITY

Where these phases meet, responsibility for the garment is transferred: from producer to consumer at retail point of sale, from consumer to reproducer after discard, and from re-producer to producer after fibre regeneration. Within each of these phases, there may be any number of individuals involved, for example: those who work within the textile production, are involved in the garment design and manufacture, at the wholesale and retail sales points, and so on. Overlaying these phases of responsibility across the garment lifetime shows that a closed loop garment life cycle (and by extension a circular fashion economy) necessitates co-operation between all participants to support all possible action within each phase: production of garments suitable for re-use and recycling, extended use practices that conclude in recycling not disposal, and reproduction technologies that reclaim all material components for remanufacture. This insight into the role of individuals within the garment lifetime led to a reconsideration of the key research question to return focus to the agency of the garment to support co-operation within its lifetime. The question becomes: How can designers and wearers of fashion share the responsibility to ensure a garment's enduring sustainability?

### 6.1.2.1 CUSTODY WITHIN THE GARMENT LIFETIME

A key contribution of this thesis is to acknowledge and respond to the fact that a garment that is used and re-used moves through periods of temporary custody. This is particularly significant as understanding a garment lifetime through a lens of shared responsibility also challenges the notion of ownership. Using this framework, a garment that is used and re-used moves through periods of temporary custody and has a life independent from who possesses it at any given time. Understanding ownership as temporary custody enables relationships of shared responsibility in the lifetime of the garment by situating the current custodian (the temporary owner) in relation to custodians that have come before and that will come after. It links custodians to one another conceptually, when they may not meet physically. Responsibility through garment custody better reflects sustain-ability as an on-going condition. It does so by removing the anthropocentric notion of ownership, one that places most importance on the individual, and instead promoting collaborative action across the garment lifetime. This is a fundamental departure from the assumption that garments have multiple lives and owners. Instead here, a garment has a single life, though it has many custodians (Figure 6.4).



FIGURE 6.4. WITHIN THE SINGLE GARMENT LIFETIME, PARTICIPANTS ARE RECAST AS CUSTODIANS.

As I will now discuss further, this concept of mutual responsibility in the lifetime of the garment is discussed as a framework for sustain-able design for garment longevity. By acknowledging the independent lifetime of the garment, the current custodian's responsibility to act with sustain-ability is reconceived as part of a mutual relationship with those who had custody before and that will have custody after. How this relationship is enabled by the garment will also be discussed in relation to the proposed framework of mutual responsibility.

## 6.2 MUTUAL RESPONSIBILITY AS A FRAMEWORK

The key contribution of the thesis is to propose the concept 'mutual responsibility' and expand on how it might be a useful framework within which to contextualise practices of fashion design and use in the transition to sustain-ability. 'Framework' is used here in its simplest sense, as in a supporting structure for something (in this case, a concept).<sup>499</sup> In putting forward a new way of conceptualising the transition to sustain-ability, the intention is to move away from terminology grounded in method (cradle-to-cradle, eco-, circular, slow) towards language based on intent: our mutual responsibility to maintain "a qualitative condition of being over time."<sup>500</sup> The potential benefit of this perspective is that intent is not shaped by method, all possible methodological approaches might be utilised in response. Theoretically, this opens up the field of action to those methods most appropriate for the problem and is especially supportive of collaborative action that might combine methods for innovative outcomes. Therefore, in the following sections, I discuss this approach as a framework of mutual responsibility in order to tease out key meanings that underpin the central thesis of the research.

### 6.2.1 THE CONCEPT OF MUTUAL RESPONSIBILITY

In the discourse on sustainability, 'responsibility' features in explanations of the causes of unsustainability and in discussions of action towards sustainability. The academic literature on responsibility for a sustainable future, discusses shared responsibility<sup>501</sup> and relational responsibility<sup>502</sup> as ways of understanding our accountability for the sustainable future of the planet. Responsible Innovation (RI)<sup>503</sup> defines the sustainable approach to science and Corporate Social Responsibility (CSR) describes the prevalent economic model of sustainability principles applied to business development, framed as responsibility.

Responsibility is a complex notion, rooted in both psychology and philosophy. It implies accountability, moral obligation and action.<sup>504</sup> It can relate to events or actions of the past, present or future. Responsibility can be attributed to others or acknowledged by the individual. The individual may be entirely responsible or share in the collective responsibility of a group. Responsibility may be attributed or accepted, whether enacted knowingly or not. While one can be responsible for something praiseworthy, responsibility is frequently a synonym for culpability; the blame of others or the guilt of

499. *Macquarie Dictionary*, Seventh edition. ed. (Sydney, New South Wales, Australia: Macquarie Dictionary Publishers, 2017)., p.602

500. Fry, *Design futuring: sustainability, ethics, and new practice.*, pp.41-43

501. For example, Barnett, *Globalizing responsibility: the political rationalities of ethical consumption*, 8., Patrizia Ghisellini, Catia Cialani, and Sergio Ulgiati, "A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems," *Journal of Cleaner Production* 114, no. Supplement C (2016/02/15/ 2016), <https://doi.org/https://doi.org/10.1016/j.jclepro.2015.09.007>

502. For example, Te Kawehau Hoskins, Betsan Martin, and Maria Humphries, "The Power of Relational Responsibility," *Electronic journal of business ethics and organization studies* 16, no. 2 (2011)

503. Defined as: "a collective commitment of care for the future through responsive stewardship of science and innovation in the present." in Richard Owen et al., "A Framework for Responsible Innovation," in *Responsible Innovation* (John Wiley & Sons, Ltd, 2013). p.36

504. *Macquarie Dictionary*. p.1277

being at fault for an action or event that is deemed morally reprehensible or illegal. Generally, accepting responsibility can involve shame, embarrassment and humiliation, and liability for the harm done.

Responsibility implies a moral (and sometimes legal) obligation for those deemed responsible to right the wrong. This simplistic logic is complicated by the fact that irresponsible actions can be undertaken knowingly or unknowingly which arguably impacts the degree to which the culprits can be held accountable. Locating those deemed responsible can be difficult in itself when the event or action is the outcome of a network of causality and actors. It also follows that the culprits identified may not possess the ability to right their wrong alone (for example: to be able to clean up a toxic spill) if at all. Following the collapse of the Rana Plaza factory complex in Bangladesh in 2013 that killed 1127 garment workers,<sup>505</sup> media and public scrutiny moved quickly from the factory owners and local authorities to naming and shaming the brands that used the factory.<sup>506</sup> Briefly, the wider systemic issues of the fast fashion system surfaced in popular media debate, both traditional and social. This came with a greater awareness of relational responsibility, (the network of accountability) but an increasingly diluted sense of who is specifically responsible for what harm and therefore its remedy also resulted. The garment factory owner is culpable for unsafe working conditions that kill workers and is punished, yet the offence is likely to be repeated elsewhere if the systemic issues that precipitate poor working conditions in all garment factories are not addressed.

Alternatively, when responsibility is separated from notions of blame, accepting responsibility need not entail taking on sole responsibility for the entire problem, nor absolving others of their share as is often inferred. Instead, in accepting responsibility for a role in things as they are (however unwitting), allows acknowledgment that accountability for the state of things is shared with others who may have similar, more, or less accountability. When separated from blame, neither the degree of accountability nor the measure of how much action should be taken need be emphasised (it's mostly your fault, you should fix it). The unevenness of responsibility, while acknowledged, is not tied to the capacity of any participant to act. Thus, shared responsibility becomes a call to action. In this sense, responsibility can be seen as enabling such that: I accept responsibility for my part, now what can I do? Responsibility is therefore repositioned as positive and future focused.

The transition to sustain-ability, requires that we also take responsibility for harm yet *to be done*, it requires an approach that is pro-active, not re-active. Sustain-ability-as-responsibility (or perhaps response-ability<sup>507</sup>) tempers the attribution of blame with a call to action. From this, a more nuanced consideration of responsibility emerges, where the line of questioning 'If... then...' reveals complex relationships between actions, behaviours and practices. Shared responsibility can ease the burden of individual blame by locating the individual within the collective. Thus, responsibility for sustain-ability

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505. Ian M. Taplin, "Who is to blame?; A re- examination of fast fashion after the 2013 factory disaster in Bangladesh," *critical perspectives on international business* 10, no. 1/2 (2014), <https://doi.org/10.1108/cpoib-09-2013-0035>

506. Andrew North, "Dhaka Rana Plaza collapse: Pressure tells on retailers and government," BBC News, 2013, accessed 25 January, 2018, <https://www.bbc.com/news/world-asia-22525431>.

507. The root of the word responsibility is 'response'. While its etymology is not a conjunction of response with ability (rather responsible and -ity), an internet search reveals that it is widely mis-read as such today, which could be a positive thing if it informs the imperative to act.

in the present and future, might be better described as 'mutual responsibility'. When 'mutual' qualifies 'responsibility', it implies a reciprocity between all participants in the duty and benefit in accepting and acting on their accountability. The word mutual defines a sense of personal involvement that synonyms 'shared', 'collective' and 'relational' do not, as terms that tend to concern others.<sup>508</sup> Mutual responsibility infers that "this is our responsibility", rather than "this is everyone's responsibility." Thus, mutual responsibility implies personal involvement in shared responsibility and acknowledges the personal obligation to join others in action. That others are implicated to act alongside the individual is critical to the concept, suggesting "we are in this together."

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## 6.2.2 EXISTING CONCEPTS OF MUTUAL RESPONSIBILITY

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Of note here is the fact that there are others that can claim ownership of the term mutual responsibility. During the period of the research study, these ideas are beginning to emerge in various forms, however not within the context of fashion design for sustain-ability. For example, there is a website for a Mutual Responsibility organisation that describes itself as "a community and growing network of like-minded people determined to promote the value of mutual responsibility to the center [sic] of public discourse."<sup>509</sup> The definition of mutual responsibility given aligns with that of this study,

*sustainable solutions to the crises facing society today must entail more than laws and regulations. To adapt to the emerging conditions, we must create a new social environment that will allow us to embrace our mutual dependence, rather than repel it, and develop mutual responsibility that will become reflected in our culture, society, politics, economy, in every aspect of human life.*<sup>510</sup>

However, at the time of writing, it is unclear if this organisation is still active.<sup>511</sup> This further demonstrates the complex nature of sustain-ability and its reliance on more than one group of participants for action and impact to result. A further search of the literature does not return any association between the terms and an existing concept or theory.

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508. The dictionary definition of 'mutual' is. "Possessed, experienced, performed, etc. by each of two or more with respect to the other or others" *Macquarie Dictionary*, p.991

509. Humanity Integrated Co., "Mutual Responsibility," accessed January 25, 2018, <http://www.mutualresponsibility.org/>.

510. Humanity Integrated Co., "Mutual Responsibility."

511. The website does not appear to have been updated in several years. It should be noted that the organisation emerged during the lifetime of this research, beginning after this project, and it would appear to have waned during the same period.

### 6.3 PRACTICING MUTUAL RESPONSIBILITY IN FASHION

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*It follows that responsibilities to behave in more sustainable ways- or rather to engage in more sustainable practices- cannot be located so resolutely with the agentive, choice making individual, but rather have to be shared far more widely among the actors involved in shaping and reproducing practices as entities and the elements that practice entities are made up of.*

- Elizabeth Shove and colleagues<sup>512</sup>

By locating the individual within the collective, the concept of mutual responsibility seeks to enable responsible individual action by all custodians in the lifetime of the garment, towards the shared goal of practicing fashion with sustain-ability. The underlying principle of action on mutual responsibility is that each custodian does all that they can to create conditions for sustain-ability. Mutual responsibility is not the action of necessity that arises from the attribution of fault or blame for the current conditions of un-sustainability, instead it is the natural action that follows from the values of shared accountability for our common future. To this end, the garment design strategies explored through the research study are the outcomes of a designer-custodian acting on values of mutual responsibility to produce garments with the capacity to facilitate action on values of mutual responsibility by the custodian-wearer. This is considered to be the full scope of the designer-custodian: to take a holistic approach to the design and development of the garment by considering not only its material components and methods of production, but how the garment, as enduring artefact, prescribes the way/s in which it is used by wearer-custodians. Re-imagining existing design strategies in support of mutual responsibility in the life time of the garment again encourages the research question to continue evolving, as it becomes: What are the opportunities for garment design to enable enduring relationships of mutual responsibility in fashion?

Practice as a method of research has been used to explore scripting and open design strategies to design garments that have sustain-able capacities built-in. As discussed in Chapter 3 through an analysis of two pairs of trousers, garment design and construction can constrain practices of extended wear by preventing actions of re-modelling required to keep a garment in use. Alternatively, *The Living Wardrobe* garments developed within the research study, discussed in Chapter 4, are designed and constructed to enable intervention. This resulted in the proposal of a list of principles for garment design for extended use. The argument has been made that functionality, purpose and fashion-ability can be maintained through extended domestic practices of garment care. For example, a simple intervention that requires no sewing skills, transforms the look of *The Cowl Skirt* by buttoning up or releasing the cowls. With some sewing skill, the waistline of the skirt may be resized. The facilities for re-modelling that the garment prototypes afford are signalled by a QR code garment label that connects to a website of instructional resources. Scaffolding interactions to cater for a range of capabilities from novice to advanced, enables participation for all levels of skill, and further seeks to enable those wearers with the inclination but not necessarily the skill, to attempt garment re-modelling.

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512. Shove, Pantzar, and Watson, *The Dynamics of Social Practice: Everyday Life and how it Changes.*, p.50

This design strategy for enabling mutual responsibility in the lifetime of the garment was described as *participatory re-design* in Chapter 5. The concept of participatory re-design as developed through the series of garment prototypes reconceptualises the participatory design process as a series of self-directed activities of re-modelling, undertaken by a wearer. As such, it provides an alternative to existing collaborative actions that rely on participants getting together to perhaps co-create the garment (customisation) or concurrently share its use (clothing rental service). In the case of participatory re-design, the barriers to participation are potentially reduced by the convenience of being able to act *when needed and as desired*. There are practical benefits also: in a globally-distributed fashion market, consumers may not be able to access the retailer buy-back program or in-store repair service but instead perform their own modifications with the distinct difference being that skills learnt there are transferable to other projects. This means that the impact of design for longevity is extended to other garments within the use phase that were not designed for longevity. The concept of participatory re-design is an example of the way in which the framework of mutual responsibility can be used to reconceptualise existing design methodologies for sustain-ability.

Garments designed within a framework of mutual responsibility extend the definition of 'sustainable fashion' beyond the sustainable garment artefact (comprising eco-materials manufactured with ethical labour) to ways of living with (i.e. using, wearing) clothing-fashion that is inclusive of actions to keep the garment in use. Wearers are presented with the opportunity to reflect on existing practices and offered the means to adopt new practices for sustain-ability.<sup>513</sup> With new materials for practicing clothing-fashion for sustain-ability come new competencies: simple actions of repair and re-making, familiar to most of us as typical domestic practices of older generations. Those skills acquired by re-modelling a *Living Wardrobe* garment are readily transferred to other garments in the wardrobe. Thus, sustain-able fashion practice is extended beyond buying sustainable fashion garments, to *doing* sustain-able fashion.

Yet there are also potential limitations to the framework of mutual responsibility. It cannot be guaranteed that the introduction of garments with capacities for extended use will lead to a change in clothing practice that sees those capacities actioned in use. The uptake of the proposed practice of wearing garments with sustain-ability depends on many other intertwined practices and may mean there is little initial uptake perhaps until other aligned products and ideologies emerge (sustainability consumption practices becomes more mainstream, resources are restricted and more costly).<sup>514</sup> However, by providing garments with the *capacity and potential* for extended use, the possibility is made available. Further, the degree to which the custodians in the lifetime of the garment might act on their values of mutual responsibility, depends on their capacity to act.<sup>515</sup> This is particularly valid for the wearer-custodian in the relationship of mutual responsibility who may be limited in their capacity to act on their values by a lack of skills or knowledge.<sup>516</sup> In the survey undertaken as part of this research and discussed in Chapter 3, just under half of the respondents indicated that they wished they could

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513. Barnett, *Globalizing responsibility: the political rationalities of ethical consumption.*, p.76

514. Yolande Strengers, "Conceptualising everyday practices: composition, reproduction and change," (May 2011 2010), p.15

515. Walker, "Beyond individual responsibility: social practice, capabilities and the right to environmentally sustainable ways of living."

516. Sanders, "Scaffolds for Building Everyday Creativity.", Laitala, "Responsibility without means."



make clothes, and that they would like to learn “one day”(48%). Keeping in mind the limitations of the survey, this is an encouraging statistic. It suggests that within a group of 160 ethically minded consumers, there is an inclination to take up the skills needed to re-model clothing. This provides a possible opportunity for existing clothing practices to be steered in new directions.

Similar constraints to practice may exist for the designer-custodian. The designer’s capacity to act on their values of mutual responsibility may be impacted by the context in which they work. While an independent designer in charge of their own company is at liberty to entirely restructure their business for sustain-ability, a designer within a large company may not have autonomy over all the decisions that inform their designs. For example, input from sourcing and sales departments may set parameters for the choice of fabric available or determine which styles are most appropriate to the target customer for the upcoming season. In such cases, the values of mutual responsibility can inform smaller design decisions within these parameters while further seeking to inflect existing workplace practices for sustain-ability. The fashion sector is renowned for copying ideas: the diffusion of changes in fashion taste through society involves groups adopting and adapting ideas from others, which at its worst leads to theft of intellectual property and counterfeit goods. Yet it might also result in the spread of new methods of designing clothing-fashion with sustainability if existing examples like *The Living Wardrobe* might be put forward by designers to convince their organisations to adopt alternative approaches.

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### 6.3.1 USE FORECASTING

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Based on values of mutual responsibility for sustain-ability, design for extended use, might be included in the fashion design process as a process or method of ‘use-forecasting’. Much like a commercial fashion designer uses ‘trend forecasting’ to predict future tastes in colours, fabrics and silhouettes, ‘use forecasting’ might be employed to determine how a garment will be worn and potentially modified, re-made and recycled. The fundamentals of designing enduring garment relationships already exist within the fashion design process and can be amplified, expanded and redirected towards extended product relationships in the interests of sustain-ability. Describing design strategies for extended use as ‘use forecasting’ and ‘participatory re-design,’ couches new approaches to fashion design practice within familiar concepts, assisting in the uptake of new methodologies. In this way, existing ways of working are redirected to a new purpose, in support of the sustain-ability of the garments produced. Similarly, the use of QR code labels and the expansion of the fashion brand website into a repository of resources in support of a peer community, extends on the use of familiar technologies. The opportunities for building virtual communities of practice around the practice of wearing fashion is an obvious area for future research and development.

Another area of future research is identified in the development of a design tool for use forecasting. Potentially, this could be in the style of IDEO method cards or the Ted 10 (discussed in Chapter 2): a suite of design prompts to assist the designer integrate principles of use forecasting into their existing design process. Some work on this has commenced as a part of this study and will be continued through ongoing research that responds to the key findings presented in the thesis.

## 6.4 KEY CONTRIBUTIONS OF THE THESIS

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There are three key contributions made as a result of this doctoral research project. Firstly, a method of redirective practice has been developed to extend the theory presented by Fry (and other similar models) within this thesis. Importantly, the model has been explored and refined through design practice. The action of the research project is fundamental to fashion design and vital to understanding theories of practice from other disciplines that are applied and refined through this study. The emphasis on sustain-ability as an on-going condition focused the study on design methods in support of extended garment use. The garment outcomes of the research practice show that the design of a garment artefact, and then the artefact itself, can play a greater role in enabling sustainable consumption by facilitating long-term wear. This thesis asserts that while designers cannot design for specific wearer experiences, by providing garments with the capacity for longevity they make that future more likely. Through the garment's design, labelling, and information available through an online community, the designer does as much as they can to enable the garment's long-term use. Thus, the definition of the sustain-able garment is extended beyond the artefact made from eco-fabric and ethical labour to its capacity to enable extended use.

The second key contribution of the thesis is that the garment artefact can enable both the designer and wearer to collaborate on action for sustain-ability within the garment lifetime. This approach to shared responsibility for the garment's sustain-ability is described here as a framework of mutual responsibility. Central to the concept of mutual responsibility is the repositioning the participants within the garment lifetime as custodians. Both designer and wearer are positioned relationally within the garment lifetime, which redefines the idea of ownership being central to the garment life cycle to a model that views the worn experience as one of temporary custody.

Thirdly, and in support of the above, this thesis proposes a holistic Garment Lifetime Diagram, that more clearly represents the importance of the use phase to the sustain-ability of the garment life cycle and provides designers with greater insight into where design interventions for prolonged use are likely to be of most benefit. Significantly, the re-examination of the life cycle assessment model identifies that the garment has only a single lifetime thus rendering current approaches to fashion design for multiple garment lifetimes as flawed. Acknowledgement of this fact led to the imperative to develop solutions for clothing-fashion longevity in support of the garment being worn by a number of sequential wearers, rather than one wearer for the long-term. This approach suits the rapid cycles of changes in taste to which clothing-fashion is subject while also acknowledging the value of classic style being rendered fashion again through the experience of wearing. A garment that has a single lifetime may be *discarded* several times, but not necessarily disposed of for recycling or sent to landfill as waste. Instead it may be recirculated through second hand channels, earlier and in a better condition than currently practiced, if it becomes fashionable to do so. A major oversight in the field of fashion design for sustainability is that contemporary clothing-fashion design is no longer designed for re-use: fashions change, so why don't garments?

## 6.5 OPPORTUNITIES FOR FURTHER RESEARCH

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While a number of opportunities for further research have been identified, the most important is to test the potential of *The Living Wardrobe* garments to foster sustain-able clothing practice in a longitudinal practice-based study that commercially produces the garments for retail sale. This would enable the online community of practice concept to be advanced and to develop in response to participants who are actually buying and caring for fashion garments. It is proposed here that beyond the provision of resources to enable garment re-modelling, a website might provide each garment with a unique webpage, documenting its evolving narrative over time: who has had custody of it and the changes they have made to it. A forum for the community to exchange their own resources for re-modelling the garments would potentially further facilitate formation of the community of practice. In this scenario the designer-custodian steps back from being the owner of the design and in keeping with the principles of open design, supports the evolution of the garment by wearers. The findings of this future study would potentially revise and strengthen the redirective practice methods for fashion design presented in this thesis.

A further opportunity for research is to extend the framework of mutual responsibility into other phases within the garment lifetime to consider how it might inform, as examples, textile production and reclamation and end of garment life scenarios. For example, how might understanding sustain-ability as a shared responsibility inform clothing-fashion design for recycling or composting when the useful garment life is exhausted?

Use forecasting as a method within fashion design practice presents great scope to be further developed into a practical tool for designing enduring garments. Following the success of toolkits like IDEO *Method Cards* and Dan Lockton's *Design with Intent* cards, a suite of use forecasting cards might be developed for designers to use in predicting likely garment futures.

Finally, the fashion design for sustain-ability methodologies presented in this thesis would benefit from further development by other practitioners in the field. To this end the research seeks to inform the practice of fashion academics, practitioners and students that have perhaps identified their own practice as being in a problematic situation of unsustainability and are similarly interested to redirect practice for a sustain-able future.

## 6.6 FINAL SUMMATION

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Design for prolonged use and re-use is critical to sustain-ability in fashion. The fact that fashions change yet garments do not, must be addressed if the devastating impacts of excessive production and consumption of clothing-fashion are to be remedied. Understanding the garment's life cycle as a single lifetime, in which the use phase comprises periods of wear by sequential custodians, suggests new possibilities for enabling sustainable clothing practices to transition from current practices of single, short-term use of clothing-fashion, to extended use and re-use by many custodians within the garment's lifetime. This study has presented a practical example of how designers can engage with emerging sustainable design theory surrounding the importance of designing products for extended consumer use. It has been shown that there is great scope for a designer-as-custodian to pre-figure the conditions of sustain-ability in the design of garments to enable re-modelling by subsequent wearer-custodians.

Further, the practice outcome of the research study, *The Living Wardrobe* (garments and website), present a viable way of maintaining fashion change with enduring garments that potentially deepens consumer engagement with clothing, increases skills and reduces the need for continuous acquisition of new clothing-fashion garments. Fashion-ability achieved through re-modelling and re-making clothing-fashion offers an alternate way for wearers to engage with fashion as a symbolic system: one that focuses on wearing rather than accumulating fashion garments. It is one way that the fashion 'high' currently satisfied through constant acquisition of new garments might be otherwise realised; through the satisfaction that comes from (re)making something yourself. Design that continues to result in garments that cannot be re-modelled, thus limiting their clothing-fashion use to one 'owner', provides an opportunity to question why, and to reconsider both design processes and consumption habits in light of the mutual responsibility to ensure future sustain-ability.

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## APPENDICES

## APPENDIX 1: CHRONOLOGICAL LIST OF KEY CONTRIBUTIONS IN THE EVOLUTION OF FASHION DESIGN FOR SUSTAINABILITY

Date	Type	Title
1992	brand	Conscious Earthwear (later Ciel) launched
1992	brand	Esprit Ecocollection launched
1994	trade magazine	Draper's Record Going Green special report
1996	University-industry research group	The Textile Environment Design (TED) research group established at Chelsea, now part of the University's Textiles Futures Research Centre.
1997	brand	From Somewhere launched – re-use luxury dead stock fabrics
1997	brand	Junky Styling launched upcycling post-consumer waste- suits
2001	brand	People Tree launched
2004	runway show	First Ethical Fashion show at Paris Fashion Week
2005	industry org	Ethical Fashion Forum established
2005	runway show	NY FW Earth Pledge's FutureFashion runway show
2006	report	Allwood, J. M., et al. (2006). "Well dressed? The present and future sustainability of clothing and textiles in the United Kingdom.": 84.
2006	runway show	Esthetica at LFW
2006	consumer magazine	Vanity Fair first annual Green Issue (2006-2008)
2006	exhibition	Well Fashioned Eco Style in the UK traveling exhibition
2007	book	Hoffman, L. and Earth Pledge (Organization), Eds. (2007). FutureFashion white papers. New York, N.Y., Earth Pledge.
2008	research centre	Centre for Sustainable Fashion established at LCF
2008	book	Black, S. (2008). Eco-Chic: The Fashion Paradox, Black Dog Publishing, London, UK.
2008	academic journal	Fashion Theory special issue vol 12, issue 4
2008	report	Fisher, T., et al. (2008). Public understanding of sustainable clothing: A report to the Department for Environment. Food and Rural Affairs
2008	book	Fletcher, K. (2008). Sustainable fashion and textiles: design journeys. London; Sterling, VA, Earthscan.

2008	Book	Hethorn, J. and C. Ulasewicz (2008). Sustainable fashion – why now?: a conversation exploring issues, practices, and possibilities. New York
2009	conference	annual Copenhagen Fashion Summit established “world’s leading business event on sustainability in fashion”
2010	trade show	The Sustainable Angle/ annual future fabrics expo established
2011	research program	Mistra Future fashion established in Sweden <a href="http://www.mistra.org/en/research/mistra-future-fashion/">http://www.mistra.org/en/research/mistra-future-fashion/</a> 2011-2019
2011	Industry resource	Ethical fashion forum launches The Source website
2011	report	Fisher, K., et al. (2011). Benefits of re-use case study: clothing WRAP.
2011	book	Gwilt, A. and T. Rissanen, Eds. (2011). Shaping sustainable fashion: changing the way we make and use clothes.
2011	book	Siegle, L. (2011). To die for: is fashion wearing out the world? London, Fourth Estate.
2012	book	Black, S. (2012). The Sustainable Fashion Handbook. London, Thames and Hudson.
2012	book	Fletcher, K. and L. Grose (2012). Fashion & sustainability: design for change. London, Laurence King.
2012	brand	Honest By – Bruno Pieters launches “the world's first 100% transparent company and pioneer in price transparency.”
2013	report	(WRAP), W. R. A. P. (2013). Design for Longevity: Guidance on increasing the active life of clothing.
2013	report	Australia, B. W. A. (2013). The 2013 Australian Fashion Report: the truth behind the barcode. Annual report established
2014	report	(WRAP), W. R. A. P. (2014). Clothing Longevity Protocol.
2014	book	Gwilt, A. (2014). A Practical Guide to Sustainable Fashion. London, Bloomsbury.
2014	public campaign	Sustainable Clothing action plan- Love your Clothes (UK)
2015	Industry resource	Brismar, Ann Circular Fashion
2015	book	Fletcher, K. and M. Tham, Eds. (2015). Routledge handbook of sustainability and fashion. Routledge international handbooks.
2016	book	Fletcher, K. (2016). Craft of Use: Post Growth Fashion, Routledge.
2016	book	S. S. Muthu and M. A. Gardetti. (eds.) Green Fashion vol. 1& 2 Singapore, Springer.
2016	TV show	War on Waste Episode 3: fast fashion and coffee cups (Australian Broadcasting Corporation TV- based on UK show of the same name)
2017	report	Centre for Sustainable Fashion releases first Pulse of the Fashion Industry report. "One of the main purposes of the report was to facilitate more dialogue about measuring sustainability performance."

## APPENDIX 2: SUMMARY COMPARISON OF DESIGN STRATEGIES PROPOSED IN A CROSS-SECTION OF RESEARCH LITERATURE

source	The Ten	Website: Industry facing	Approaches to the Fashion Paradox	Book (Practitioner handbook)	Emerging design strategies in sustainable production and consumption of textiles and clothing	Scholarly article	Circular Fashion	Website: industry facing
author	Textiles Environment Design		Sandy Black		Kirsi Niinimäki, Lotta Hassi		Anna Brismar	
reference	<a href="http://www.tedresearch.net/teds-ten-aims/">http://www.tedresearch.net/teds-ten-aims/</a>		Eco-Chic: The Fashion Paradox, 2008		Journal of Cleaner Production 2011		<a href="http://circularfashion.com/key-principles/">http://circularfashion.com/key-principles/</a>	
1. Design to Minimise Waste		This strategy encourages designers to minimise the waste that is created in the textile industry, both pre and post consumer. It includes zero waste cutting and recycling but it also introduces the idea at the outset that we need to avoid producing stuff that doesn't work, that people don't want.	Re-thinking design for the entire fashion life cycle:	Design concern for use and end-of-life and possible reuse or disassembly	Product attachment and emotionally satisfying design	A deep product attachment has the potential of extending the life span of the product. The objectives of "empathic design" and emotionally durable design are to build on a deeper understanding of the individual consumer's needs and values (e.g. Chapman, 2009). The aim is to design products that are meaningful to the user over a long period of time and thus they are not easily disposable.	Principle 1: Design with a purpose	With the growing pressure on Earth's natural resources, it is of paramount importance to design products with a good intent and specific purpose. We do not want to contribute to over-production and unnecessary waste generation by making products that are used only a few times and then left unused or discarded. Rather, companies should aim to produce items that are fully appreciated and used actively a maximum number of times throughout their lifetime.
2. Design for Cyclability		This strategy explains how when you design for cyclability, the thought process is very different, but totally connected to, the practice of recycling textiles.	Reclaim and reuse waste materials:	Design with materials that would otherwise be discarded			Principle 5: Design for recyclability	"...careful consideration should be given at the design and sourcing stage to how these recyclable parts can be separated from the product, if necessary, and then recovered through various steps for material recycling."
3. Design to reduce chemical impacts		This strategy is about appropriate material selection and processes for any product to minimise environmental impacts.	Use ecological materials:	Design choices for environmentally benign fibres, fabrics and other materials seeking to minimize impact			Principle 4: Design for biodegradability	In order to minimize the risk for any harmful compounds to be released into our environment, it is crucial that we design and produce products that are 100 percent safe and effective to both biodegrade or incinerate. (This, as we rarely know at the design stage if the product will be sent to landfill or burnt in its end of life.)
4. Design to reduce energy and water use		Energy consumption and water usage in the textile industry are extremely high and occur at each stage of the lifecycle of textiles – at the production stage, in the use phase (where consumers use and care for textiles and garments) and at the end stage (which covers either disposal and/or use of the material).	Reduce:	Design for minimal use of energy, minimize or eliminate waste materials			Principle 3: Design for resource efficiency	Text to be added [no description provided]
5. Design that explores clean/better technologies		Replacing systems of production with less energy consuming and smarter technologies to reduce environmental impacts.	Harness new technology:	Apply technology to achieve reductions in energy, materials or develop more efficient new process			Principle 7: Source and produce without toxicity	Text to be added [no description provided]
6. Design that takes models from nature and history		This strategy is about how much textile designers can find inspiration and information for future sustainable design from studying and reflecting upon nature as well as textiles, habits and societies of the past.	Upcycle:	Design using reprocessed or waste materials to make a product of equal or higher value			Principle 9: Source and produce with renewables	Text to be added [no description provided]
7. Design for ethical production		This is about design that utilises and invests in traditional craft skills in the UK and abroad. It is about ethical production which supports and values workers' rights, and the sourcing of fair trade materials. It questions what ethical production means, and how it differs for each scale of production and manufacture.					Principle 10: Source and produce with good ethics	Text to be added [no description provided]
8. Design to reduce the need to consume		This strategy is about making stuff that lasts, stuff that we really want and want to keep and look after, and the design and production of textiles and products which adapt and change with age. This strategy is also about exploring alternative forms of design and consumption such as co-design and collaborative consumption.	Multifunctional clothing:	Design with more than one use or configuration	Long life guarantee and product satisfaction	As Mont argues (2002), manufacturers could shift the focus of their operations from exchange value to use value, which offers new opportunities to increase the intrinsic product quality and durability. Hence manufacturers can offer a longer product life span and deeper enjoyable use experiences to consumers.	Principle 2: Design for longevity	Design for longevity actually covers three individual principles, i.e. Design for durability Design for long lasting style Design for repair and redesign through disassembly



source	The Ten	Website: Industry facing	Approaches to the Fashion Paradox	Book (Practitioner handbook)	Emerging design strategies in sustainable production and consumption of textiles and clothing	Scholarly article	Circular Fashion	Website: industry facing
author	Textiles Environment Design		Sandy Black		Kirsi Niinimäki, Lotta Hassi		Anna Brismar	
reference	http://www.tedresearch.net/teds-ten-aims/		Eco-Chic: The Fashion Paradox, 2008		Journal of Cleaner Production 2011		http://circularfashion.com/key-principles/	
9. Design to dematerialise and develop systems and services	This strategy introduces the concept of designing systems and services instead of, or to support, products, e.g. lease, share, repair.		Recreate:	Creatively re-think, customize or re-design an existing design concept	Services for intensive and longer utilization	Services for intensive utilization question the need for ownership of a product. Through shared use of goods, it is possible to reduce the material and resource flows and achieve a more intensive utilization of a product. This can mean renting or leasing, the replacement of goods with services, and non-profit networks for lending and sharing, as well as garment exchange stocks operating through the internet.	Principle 15: Consider rent, loan, swap, secondhand or redesign instead of buying new	The three consumer principles are not explored as this website
10. Design activism	In this final strategy we encourage designers to leave behind the product and work creatively with the consumers and society at large. It is about designing events and communication strategies beyond product design to increase consumer and designer knowledge about the environmental and social impacts of fashion and textiles. Here, the textile designer becomes a 'Social Innovator'. We reflect on how much has changed for textile designers, and how much potential for the future there is!							
							Principle 6: Source and produce more locally	Text to be added [no description provided]
			Recycle:	Design using already reprocessed waste materials			Principle 8: Source and produce with efficiency	Text to be added [no description provided]
					Design services	Today, designers are able to create individual and unique looks by using digital technologies that enable placing the consumer's attachments, emotions, and wishes at the centre of the design process, securing a deep product relationship and increasing the likelihood of a long life span of the product	Principle 11: Provide services to support long life	Text to be added [no description provided]
			Use mono materials	Use of only one material to facilitate recyclability			Principle 12: Reuse, recycle or compost all remains	Text to be added [no description provided]
					Co-creation and open source design	Co-design approaches encourage participation of the end users in the design process. A co-design process offers multiple stakeholders the opportunity to collectively learn, solve problems and develop a design outcome with deeper consumer satisfaction.	Principle 13: Collaborate well and widely	Text to be added [no description provided]
			Repair and remodel:	Make good an existing item fit for new purpose			Principle 14: Use, wash and repair with care	The three consumer principles are not explored as this website
			Longer lasting fashion:	Design with high quality materials and making, with aesthetic durability creating emotional bonds in addition to function			Principle 16: Buy quality as opposed to quantity	The three consumer principles are not explored as this website
			Design for delight:	Creating new and sustained feel-good relationships with clothes to be valued	Customization, halfway products and modular structures	As Chapman (2009) points out, products that are easily personalized or customizable offer an opportunity to create a deeper emotional bonding between the user and the product. Through customization, the user can create personal meanings and form attachments to products		

## APPENDIX 3: COPIES OF ETHICS APPROVALS

## DATA GATHERING (SURVEY)

 **RMIT University**  
*Human Research Ethics Sub-Committee*  
*Office of the Pro Vice-Chancellor*

**Design and Social Context  
College Office**

Building 101, Level 10  
 171 La Trobe Street  
 Melbourne VIC 3000  
 Australia

GPO Box 2476V  
 Melbourne VIC 3001  
 Australia

• [www.rmit.edu.au](http://www.rmit.edu.au)

Dear Joanne,

**Re: Human Research Ethics Application – Register Number CHEAN B-2000-09/11**

The Design and Social Context College Human Ethics Advisory Network (CHEAN) at its 6<sup>th</sup> October 2011 meeting assessed your ethics application entitled: *'The Living Wardrobe'*.

I am pleased to advise that your application has been approved at a Low Risk classification by the committee. This approval will now be reported to the University Human Research Ethics Committee for noting. The Committee would like to thank you for the high quality of the application.

Your ethics approval expires on **31 December 2013**.

Please note that all research data should be stored on University Network systems. These systems provide high levels of manageable security and data integrity, can provide secure remote access, are backed on a regular basis and can provide Disaster Recover processes should a large scale incident occur. The use of portable devices such as CDs and memory sticks is valid for archiving, data transport where necessary and some works in progress. The authoritative copy of all current data should reside on appropriate network systems; and the Principal Investigator is responsible for the retention and storage of the original data pertaining to the project for a minimum period of five years.

You are reminded that an Annual /Final report is mandatory and should be forwarded to the College Ethics Subcommittee Secretary by mid-December 2011. This report is available at <http://www.rmit.edu.au/browse;ID=6sqqx7sd0wkp> or can be located by following the link under Policy at <http://www.rmit.edu.au/dsc/chean>.

Should you have any queries regarding your application please seek advice from the Chair of the College Human Ethics Advisory Network (CHEAN)

On behalf of the DSC College Human Ethics Advisory Network I wish you well in your research.

Yours sincerely,

Secretary  
 DSC College Human Ethics Advisory Network  
 Cc: Assoc. Professor Robyn Healy, School of Architecture and Design

## VISUAL DOCUMENTATION OF PARTICIPANTS IN RESEARCH STUDY (PHOTOSHOOT WITH FIT MODEL)



Design and Social Context College Human Ethics Advisory Network (CHEAN)  
Sub-committee of the RMIT Human Research Ethics Committee (HREC)

### Notice of Approval

**Date:** 18 March 2014

**Project number:** CHEAN B 0000017573-02/14

**Project title:** The Living Wardrobe

**Risk classification:** Low Risk

**Investigator:** Professor Robyn Healy and Ms Joanne Cramer

**Approved:** From: 18 March 2014 To: 31 December 2016

I am pleased to advise that your application has been granted ethics approval by the Design and Social Context College Human Ethics Advisory Network as a sub-committee of the RMIT Human Research Ethics Committee (HREC).

#### Terms of approval:

- 1. Responsibilities of investigator**  
It is the responsibility of the above investigator/s to ensure that all other investigators and staff on a project are aware of the terms of approval and to ensure that the project is conducted as approved by the CHEAN. Approval is only valid whilst the investigator/s holds a position at RMIT University.
- 2. Amendments**  
Approval must be sought from the CHEAN to amend any aspect of a project including approved documents. To apply for an amendment please use the 'Request for Amendment Form' that is available on the RMIT website. Amendments must not be implemented without first gaining approval from CHEAN.
- 3. Adverse events**  
You should notify HREC immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
- 4. Participant Information and Consent Form (PICF)**  
The PICF and any other material used to recruit and inform participants of the project must include the RMIT university logo. The PICF must contain a complaints clause including the project number.
- 5. Annual reports**  
Continued approval of this project is dependent on the submission of an annual report. This form can be located online on the human research ethics web page on the RMIT website.
- 6. Final report**  
A final report must be provided at the conclusion of the project. CHEAN must be notified if the project is discontinued before the expected date of completion.
- 7. Monitoring**  
Projects may be subject to an audit or any other form of monitoring by HREC at any time.
- 8. Retention and storage of data**  
The investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.

In any future correspondence please quote the project number and project title.

On behalf of the DSC College Human Ethics Advisory Network I wish you well in your research.

## APPENDIX 4: SURVEY OF CONSUMER PRACTICES IN AUSTRALIA

### SUMMARY OF RESULTS

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#### Demographics

Are you male or female?

Male 23.8%

Female 76.2%

Skipped question 11

Which category below includes your age?

18-25 7.9%

25-34 36.8%

35-44 30.9%

45-54 15.8%

55-64 7.2%

65+ 1.3%

Skipped question 10

Domestic situation: Are you single or in a relationship?

Single 26.7%

Relationship 73.3%

Skipped question 12

Are you a:

Home owner with mortgage 38.2%

Home owner without mortgage 16.4%

Renting 40.1%

Living at home/free board 5.3%

Skipped question 10

Do you have children living at home or dependents you care for on a full-time basis?

Yes 24.5%

No 75.5%

Skipped question 11

Occupation: are you

Employed full time 65.8%

Employed part time 11.8%

Casual 3.9%

Unemployed 1.3%

Retired 3.3%

Studying 10.5%

Full time parent 3.3%

Skipped question 10

What is your occupation?

Answered question 119 comments

Skipped question 43

22 Academic,

11	Administrator
8	Art/design/photography creative practice
4	Arts Management
5	Consultant
12	Fashion
3	Finance
8	IT
2	Law
4	Librarian
7	Management
7	PR/Marketing
3	Public service
4	Retail
3	Self employed
6	Other occupations

Briefly describe what you do at work:

Answered question 117 (left comments)

Skipped question 45

Briefly describe what you do day-to-day when you are not at work (or if you do not work) in the evenings and on weekends:

Answered question 141 (left comments)

Skipped question 21

Briefly describe what you enjoy doing for leisure (hobbies/sports etc.):

Answered question 143 (left comments)

Skipped question 19

I usually wear an Australian size:

Answer Options

Response Percent Count

women's 6	3.3%
women's 8	13.2%
women's 10	23.8%
women's 12	17.9%
women's 14	9.3%
women's 16	5.3%
women's 18	0.7%
women's 20+	0.7%
Men's small	5.3%
Men's medium	9.3%
Men's large	8.6%
Other (please specify)	2.6% (4 comments)

Skipped question 11

Where do you live? (149 comments)

15 NSW

2 ACT

1 Qld

1 SA

3 WA  
 19 Tas  
 102 Melb  
 2 NZ  
 1 UK  
 1 USA

What is your furthest level of education?

High school 8.1%  
 TAFE or equivalent certificate or diploma 10.7%  
 University undergraduate degree 49.0%  
 University post-graduate degree 32.2%  
 Skipped question 13

Attitude to fashion trends:

44% said I am aware of fashion trends and create my take on them by mixing new purchases with my existing wardrobe.

35% said I am interested in fashion but not in fashion trends, I have my own style.

16% said I am not especially interested in fashion at all; I buy new clothes when old ones wear out.

Only 2% said: I follow fashion trends and frequently update my wardrobe

I sometimes buy clothing when it catches my eye, even if I don't need it.

Strongly agree/agree 74%

I don't mind paying a premium for quality clothing.

Strongly agree/agree 87%

I want my clothing to last several seasons.

Strongly agree/agree 95%

I buy clothing that is fashionable but cheap because I won't be wearing it for long.

Strongly disagree/disagree 83%

I don't mind paying a premium for a designer brand name.

Strongly agree/agree 49% Strongly disagree/disagree 51%

I don't mind paying extra for garments made in Australia.

Strongly agree/agree 84%

I purchase new clothing at suburban shopping centres/malls

Mostly/sometimes 41%

Rarely/never 59%

I purchase new clothing at suburban shopping strips/on the High St

Mostly/sometimes 56%

Rarely/never 44%

I purchase new clothing in the city centre (Melbourne, Sydney etc).

Mostly/sometimes 72%

Rarely/never 28%

I purchase new clothing online.

Mostly/sometimes 43%

Rarely/never 56%

If you answered mostly or sometimes to the last question, please provide a brief description of clothing you buy online and... 49 comments.

I purchase clothing at budget department stores like K-Mart, Target and Big W

Mostly/sometimes 33%

Rarely/never 66%

I purchase clothing at budget fashion chain stores like Katies, Rivers, Cotton On

Mostly/sometimes 32%

Rarely/never 68%

I purchase clothing at fashion chain stores like Country Road, Cue, Witchery, G-Star, Zara

Mostly/sometimes 57%

Rarely/never 42%

I purchase clothing at department stores like David Jones or Myer

Mostly/sometimes 62%

Rarely/never 38%

I purchase clothing at Australian/NZ designer multi-brand boutiques like Fat, Alice Euphemia, Souk Lifestyle, Husk, NomD. Belinda

Mostly/sometimes 36%

Rarely/never 64%

I purchase clothing at international multi-brand designer boutiques like Left, Cose Ipanema, Eastern Market, Marais, Christine's

Mostly/sometimes 22%

Rarely/never 88%

I purchase clothing at Australian/NZ designer brand boutiques like Alpha60, LifewithBird, Karen Walker, Zimmerman, Bettina Liano, Sass and Bide, Veronika Maine

Mostly/sometimes 41%

Rarely/never 59%

I purchase clothing at luxury international brand designer boutiques like Chanel, Prada, Louis Vuitton

Mostly/sometimes 3%

Rarely/never 97%

I purchase clothing second-hand at charity shops/vintage stores

Mostly/sometimes 53%

Rarely/never 47%

I purchase clothing second-hand on Internet auction sites

Mostly/sometimes 24%

Rarely/never 76%

Complete if appropriate: I do most/some (select which) of my clothing shopping somewhere else.

Overseas/ Online / Direct from designer / Clothes swaps

Please explain: (23 comments left)



Do you make your own clothes?

- Mostly 3.9%
- Sometimes 14.3%
- Rarely 18.8%
- Never. I don't sew. 47.4%
- Never. Although I can sew. 15.6%

Why do you make your own clothes? (56 comments left)

Please describe some garments you have made in the past 3 years. Do you still wear them? (56 comments left)

How and when did you learn to make clothes?  
(56 comments left)

Do you wish you could make clothes?

- Yes 47.4%
- No, not really. 52.6%
- Yes, I would like to. 47.8%
- No, I doubt it. 52.2%
- Please explain? (13 comments left)

In response to the question:

Briefly describe a garment you have owned for a long time and still wear.

How did you acquire it?

- I bought it new. 66.7%
- I bought it second-hand. 14.7%
- It was a gift. 4.0%
- It was a hand-me-down. 8.0%
- Other (please specify) 6.7% (10 comments left)

Skipped question 12

For what occasions or activities do you wear this garment today?  
(121 comments left)

Are these the same occasions/activities you wore the garment at when you first acquired it?

- Yes 81.0%
- No 19.0%
- Please explain? (33 comments left)

Have you ever altered it?

- Yes 9.9%
- No 90.1%
- If Yes, please describe alteration:  
(12 comments left)

What is it about this garment that makes you keep wearing it?

Answered question (121 comments left)

Skipped question 41

Do you remember how much it cost? How much?

Answered question (121 comments left)

Skipped question 41

Was that expensive for you at the time or was it a bargain?

Very expensive! A real splurge. 10.7%

Expensive. More than I would usually pay. 17.4%

Average price for that type of garment. 43.0%

Cheap. On sale perhaps? 9.1%

Absolute bargain! Lucky me! 18.2%

Sorry, I really don't remember. 1.7%

Skipped question 41

Have you worn it continually since you acquired it?

Yes, frequently. 54.1%

Yes, occasionally. 34.5%

No, it's been put away then taken back out. 11.5%

Please explain? 68 comments

Skipped question 14

On average, how often do you wear it now?

At least once every fortnight 31.1%

About once a month 13.5%

A few times a season 24.3%

A few times a year 11.5%

Once or twice every few years 2.0%

Other (please specify) 17.6% (26 comments left)

Skipped question 14

Is this more or less often than when you first acquired it?

More often 7.4%

Less often 34.5%

About the same 58.1%

If you answered more or less often, please explain why? (52 comments left)

Skipped question 14

In response to the question:

Briefly describe a garment you have owned for a long time, still keep but no longer wear.

Answered question 144

Skipped question 18

When did you get it? (144 comments left)

How did you acquire it?

I bought it new. 55.6%

I bought it second-hand. 13.9%

It was a gift. 6.9%

It was a hand-me-down. 4.2%

Other (please specify) 19.4% (28 comments left)

Skipped question 18

Do you remember how much it cost? How much? (100 comments left)

Skipped question 62

Was that expensive for you at the time or was it a bargain?

Very expensive! A real splurge. 10.0%

Expensive. More than I would usually pay. 25.0%

Average price for that type of garment. 37.0%

Cheap. On sale perhaps? 11.0%

Absolute bargain! Lucky me! 11.0%

Sorry, I really don't remember. 6.0%

Skipped question 62

Why don't you wear it anymore? (144 comments left)

## APPENDIX 5: LIST OF HISTORICAL TEXTS REVIEWED AS PART OF THE RESEARCH THROUGH DESIGN PHASE

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Conover, Isabel De Nyse. *A Complete Course in Dressmaking*. New York: E. J. Clode, 1922.

*The Dressmaker: A Complete Book on All Matters Connected with Sewing and Dressmaking from the Simplest Stitches to the Cutting, Making, Altering, Mending and Caring for the Clothes*. 2nd. ed. New York: The Butterick Publishing Company, 1916.

Gough, E. L. G. *Processes in Dressmaking* / by E.L.G. Gough. Sydney: Cornstalk Publishing, 1928.

Howard, Constance, ed. *Complete Dressmaking in Pictures*. London: Odhams Press Limited, 1955.

Hynes, R. M. *The Home Dressmaker: A Complete, Simple and Practical Home Instruction Course, Giving Detailed Instruction in All Branches of Ladies' and Childrens' Garment Cutting, Modelling, Etc., for the Beginner as Well as the Experienced*. Sydney: Ross Hynes, College of Dressmaking, 1944.

Lane, Thelma. *Short Cuts to Sewing Skill*. New Jersey: A .S. Barnes and Co., 1967.

Mauck, Frances F. *Modern Sewing Techniques*. Edited by Dorothy L. Stepat. New York: MacMillan, 1963.

National Archives. *Make Do and Mend: Keeping Family and Home Afloat on War Rations: Reproductions of Official Second World War Instruction Leaflets*. Great Britain: Michael O'Mara Books Ltd., 2007.

Patterson, Annie S. ed. *The Big Book of Needlecraft*. London: Odhams Press Ltd., 1935.

Reader's Digest Association. *Reader's Digest Complete Guide to Sewing*. Sydney: Reader's Digest Services Pty. Ltd., 1977.

Resek, Ellen, and Marietta Resek. *Successful Dressmaking: The Complete Book of Dressmaking, Fully Illustrated with Step-by-Step Instructions*. Edited by Marietta Resek. Melbourne: Colorgravure Publications, 1952.

Schwebke, Phyllis W. *How to Tailor: A Handbook for Home Tailoring*. revised ed. Milwaukee: The Bruce Publishing Company, 1965.

Storer, H. Olive. *Manual of Dressmaking and Educational Needlework*. 2nd. ed. Melbourne: George Robertson and Company, 1915.

Women's Institute of Domestic Arts and Sciences. "Tailored Garments." *The Whitefriars Press*, c.1928.

## APPENDIX 6: PARTICIPANT QUESTIONS FOR PROTOTYPING TRIALS



Thank you for your assistance with my research project.

The purpose of this prototype testing is to gauge the user experience of the resources created. Your reflection on the task as you undertake it will be very insightful and will help inform improvements.

Therefore, please keep notes on your experience as you go along, responding to the prompts on the next page. I will ask you to share these with me at the conclusion of the project.

To help me interpret your response to this exercise, please complete the following questionnaire.

Name: \_\_\_\_\_

*(to protect your identity your name will be changed in the research if your responses are directly referenced)*

Which of the below best describes your sewing ability?

- ☐ Expert *(can successfully construct garments of my own design)*
- ☐ Very competent *(can make up advanced commercial patterns, e.g. Vogue, Burda)*
- ☐ Competent *(can make up commercial patterns though some are challenging)*
- ☐ Basic competency *(can mend and make simple alterations)*
- ☐ Novice *(enthusiastic but with little practice –yet!)*

What sewing equipment do you have? *(Tick all that are appropriate)*

- ☐ Basic domestic sewing machine
- ☐ Fully featured domestic sewing machine (e.g. quilting or embroidery capabilities)
- ☐ Industrial straight sewing machine
- ☐ Domestic overlocker
- ☐ Industrial overlocker
- ☐ Other: \_\_\_\_\_

Which of the below best describes how you learnt to sew? *(Tick all that are appropriate)*

- ☐ At TAFE/University
- ☐ At high school
- ☐ At primary school
- ☐ At home by mum
- ☐ At home by dad
- ☐ By grandparent
- ☐ Community group
- ☐ Self taught
- ☐ Other: \_\_\_\_\_

Comment:

On average, how often do you sew using a sewing machine?

- Weekly
- Once or twice a month
- A couple of times a year
- Very rarely

Do you do any of the following to any level of competency, even infrequently? *(please circle all appropriate)*

Knit      Crochet      Embroidery/Needlework      Tapestry/Cross stitch

### Time taken

Please note the time when you start and end the project. If you take breaks, note those too.

### Resources

If you have any problems with the resources provided, or find any errors, please make notes. This could be an obvious mistake in the instructions, a broken link on the website, or it might be that the resources provided are inadequate in some way, in which case please explain (e.g. need more detail in sewing instructions). Please take photos where appropriate.

### Task Reflection

Please jot notes and take photos (if appropriate) along the way to document your experience. Is it all going well? Are things not working out? Have there been any surprises- good or bad?

At the end of the exercise, please respond to the questions below:

Considering what you were asked to do, do you think it took a long time?

Given your sewing ability, was this an easy or challenging task to undertake?

Was it satisfying? Whether you answer yes or no, please explain in what way/s?

If you were to do it again, what would you do differently?

How could the experience be improved?

Any other comments?

Thank you again😊 I may be in touch for a short follow up interview to expand on your comments above.

## APPENDIX 7: RESEARCH OUTCOMES DURING THE PERIOD OF CANDIDATURE

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### Publications

Cramer, J. "Wear, Repair and Remake: The Evolution of Fashion Practice by Design." Shapeshifting: A Conference on Transformative Paradigms of Fashion and Textile Design, Auckland University of Technology, Textile and Design Lab and Colab at Auckland University of Technology, 14-16 April 2014.

Cramer, J. "The Living Wardrobe: A Redirective Fashion Practice." 10th European Academy of Design Conference – Crafting the Future, Gothenberg, Sweden, European Academy of Design, 2013.

Cramer, J. "Made to Keep: Product Longevity through Participatory Design in Fashion." *Design Principles and Practices: An International Journal* 5, no. 5 (2011): 437-46.  
<https://doi.org/http://ijg.cgpublisher.com/product/pub.154/prod.516>

### Exhibitions

"Cowl Dress" *Refashioned: sustainable design survey*, RMIT Link First Site Gallery, Melbourne, Australia, 26 March- 5 April 2013

"Outfit from The Living Wardrobe", *Slow Fashion Studio: alternative approaches to fashion in conjunction with Fast Fashion: the dark side of fashion*, RMIT Gallery, Melbourne, Australia, 21 July – 9 Sept 2017